THE GROWTH AND DISTRIBUTION OF POPULATION IN RELATION TO AGRICULTURAL RESOURCES IN THE UPPER GANGA-YAMUNA DOAB (1901-1951)

THESIS SUBMITTED
AT
THE ALIGARH MUSLIM UNIVERSITY, ALIGARH
FOR
THE DEGREE OF DOCTOR OF PHILOSOPHY
IN
GEOGRAPHY

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ABSTRACT

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A B S T R A C T

1. Prefatory Note

Preamble: Population Geography has, of late, been attracting the attention of increasing number of geographers especially those of the U.S.A. From the year 1953 when Professor Trewartha published his article on "A Case for Population Geography" the study of population has become one of the most growing branches of Geography. Since then tremendous work has been done by the geographers in the U.S.A. In India, however, little work has been done in this field of geography. The present work is a venture on micro-regional study of population of a selected Indian territory. For this purpose the Upper Ganga-Yamuna Doab has been selected for the reason that the area is intimately known to the author and that it is a well defined geographic region.

The Subject of Study: Since the Upper Ganga-Yamuna Doab comprising the districts Saharanpur, Muzaffarnagar, Meerut and Bulandshahr is one of the most agriculturally fertile regions of Uttar Pradesh, it is proposed to examine the dynamism of Population in relation to agriculture which has long been and is still the mainstay of the majority. Half century period from 1901 to 1951 has been adopted for this purpose. The period could not be extended

to 1961 because the detailed census figures for such small units as parganas and tahsils were not available for that year at the time when the project was undertaken. Nevertheless the fifty - year period seems to serve the purpose of the proposed study not only by virtue of its length but also because it encompasses a number of demographic, economic and political vicissitudes.

The Objective: The principal objective of the study is to make a regional analysis of the growth, distribution and composition of population of the Upper Ganga - Yamuna Doab and to examine the effects of the changes in these facets of Population on agriculture which has the privilege of being the most significant thread in the warp and woof of the region's economy. The trends and rates of various aspects of population and the progress of agriculture have been examined with the set aim of investigating into the possible consequent disturbances in the balance between the population and basic resources of the region. It is therefore also the intent and purpose of the present work to make certain specific suggestions in the light of the findings of the study for a rational population policy and a judiciously suitable programme for the progress of agriculture in the region.

Originality of Work: The main body of thesis comprising the study of all the principal aspects of population, the progress of agriculture, the

pressure on land and the conclusion covering 450 pages with about 100 maps and diagrams is absolutely original work based on original statistics, data and records. This type of study for the Upper Ganga - Yamuna Doab has never been done before either within or without India. Besides, the occupational analysis of the urban population is based on a statistical formula developed by the author and published in The Geographer of 1965. Since its publication the formula has been constantly used and acclaimed by a number of research scholars of Urban and agricultural geography.

The Source Material: The work is based on various publications of census of India from 1891 to 1951; the district gazetteers; various supplements to the district gazetteers; the old and recent settlement reports; various administrative and industrial survey reports of U.P. and the districts of the Upper Doab and miscellaneous commission reports such as Zamindari Abolition Report, Famine Inquiry Commission Report, the Agrarian Distress Enquiry Committee Report, Report of the Royal Commission on Agriculture of India and the like. The outline of the map of the region has been prepared from 42 relevant sheets of the Survey of India Maps and the district maps contained in the gazetteers.

The part which deals with physical environment of the region is based on the relevant articles and chapters of

various Memoirs of the Geological Survey of India; relevant data and notices from Memoirs of the Metereological Department of India and Settlement and Soil Survey Reports of U.P.

Besides these original source materials a number of standard books and articles on the principles of population and population geography and various aspects of population of India and other countries of the world and the demographic year books and other allied publications of the United Nations have also been used in order to incorporate the modern trends and patterns of population geography in the organization and plan of the work.

The detailed agricultural statistics have been taken from the Directorate of Agriculture, U.P. and from the Sadar Tahsil Office of the Meerut division, Meerut.

Contribution to the Advancement of Geography:

The contribution which the present work may claim to have made for the advancement of the study of geography may be assessed and appreciated from two facts: Firstly, it is a comprehensive micro - regional study of population dynamism and distribution specifically oriented to comparative and co-ordinated analysis with the basic resources of the region. In this respect the work may be considered as the first of its kind as somewhat similar works that have been attempted are for the whole of the world or for the continents

and the countries of the continents. In this respect the present study may be regarded as a substantial contribution to advance the study of regional population geography.

Secondly, the work introduces for the first time a detailed geographical analysis supported with more than a hundred maps and diagrams of the trends and behaviour of population numbers in the Upper Ganga - Yamuna Doab. No study of the population geography of this region has ever been made before and as such the present work may claim to have made a very concrete addition to knowledge about the geography of the region.

It may thus be appreciated that the present work appears to advance both the study of the science of geography as such as well as the geographical knowledge of a selected region of India.

2. The Outline of the Study:

The work is divided into three parts. The first part which deals with the physical environment presents the topographic, climatic and edaphic characteristics of the geographic personality of the region. The part covers fifty pages including eleven sheets of maps and diagrams.

The second part constitutes the main corpus of the work. This part comprises eight chapters and contains 417 pages including 75 sheets containing more than 100 maps and diagrams.

The first chapter presents a brief outline of the main aspects of the growth and distribution of population in the region during the 19th century. The growth of numbers traced from 1846 when the first census was undertaken shows that all through the decades of the 19th century the population has been on an ascendency. However it is also emphasized that the figures of the earlier censuses i.e., those preceding the 1871 census are not quite reliable.

The second chapter embodies a thorough analysis of the growth of population during the first half of the twentieth century. The analysis which is attempted with special reference to agricultural situation reveals that the dynamism of numbers has passed through three phases of growth namely the first phase of general decline extending over the first two decades and the second phase of recovery from and smoothening of the losses of the earlier decades and the third phase of steady and accelerated growth during the last two decades of the selected period.

In the third chapter the growth, distribution and structure of the rural and urban segments of the population are discussed in full length with legitimate reference to the state of agriculture in the region. The comparision of the rates of growth clearly shows that the urban population has grown nearly twice as fast as the rural population.

Even in the rural population a tendency towards increased concentration is strongly revealed by the analysis of the variation in the villages by size categories. Male - female ratio and differential birth and growth - rates indicate that there has been an increasing rural/urban migration especially after 1931. In urban population also the rate of increase in cities and big towns has been uncomparably large whereas some smaller towns have actually declined in their population. A tendency towards greater concentration is therefore also very markedly noticeable in the urban population. Occupational structure of the urban population is conspicuous for the predominance of agricultural occupations and a relatively insignificant position of industries and commerce.

In the next two chapters the sex and age structure of the population are discussed. The Upper Doab's population is highly masculine. In 1951 the sex - ratio is found to be 842 per thousand this means a reduction by 36 per thousand in 50 years as the ratio in 1901 was 878 per thousand. The female deficiency is higher in the urban than in the rural population. This is probably due to the high percentage of male migrants from villages. Because of female deficiency the region has the advantage of having greater labour force and lesser b urden of feminal dependency.

According to Sundbarg's criterion the population of Upper Doab is highly progressive as the proportion of

below - fifteens is as high as 38 per cent. The economy of the region is consequently under a heavy burden of juvenile dependency and in all probability is bound to bear still greater burden as the huge number of under - fifteens will be the active producers within two decades i.e., by 1971. In respect of age the region's population is very much comparable to the Latin American countries noted for population explosion.

The occupational composition of the population is discussed in the next chapter. The predominance of agricultural means of livelihood is but natural, nevertheless the Upper Doab has the distinction of having the lowest percentage of population dependent on agriculture in the State. The percentage of persons dependent on agricultural and non - agricultural means is about 55 and 45 respectively whereas the corresponding figures for the country and the State are 70 and 30, and 74 and 26 respectively. The analysis of self - supporting persons, earning and non - earning dependents indicates a substantially high burden of dependency of non - earning dependents. The position of secondary means of livelihood is far from satisfactory. Among the secondaries too agriculture is most predominant. There is great scope for the introduction of such non - agricultural secondaries which may prove useful for increasing the productivity of the land and the efficiency of the farmer.

Among the non - agricultural means of livelihood the striking features are relative insignificance of industry and commerce and high proportion of private and miscellaneous services. This shows a lack of co-ordination between the basic (i.e., agricultural) and the auxiliary (i.e., non - agricultural) occupations of the region.

In the chapter that follows the progress of agriculture during the fifty - year period is examined in legitimate detail. On the whole the progress in cultivation has been extremely slow leading to an almost 33 percent reduction in the per capita share of cultivated area during the half century. There is no doubt about the fact that the agriculture has badly failed to keep pace with the growing population. It is, however, gratifying to note that the rate of increase in double cropping has been higher than the rate of population growth but this could not bring about any noticeable amelioration in the agricultural situation as the over all proportion of double cropped area is still not very great. Probably because of rapid urbanization the cultivation has become increasingly cash and coin oriented and it is indeed a tragic fact that during the past fifty years the proportion of food grops has rather declined and thus the amount of foodgrains available from the region for every man, woman and child of the region has declined by about 23 per cent. Small size of

holdings is a chronic malady of the agriculture of the region. Taking 6.5 acres per head as the size of an economic holding it is found that more than 75 per cent of the holdings are below the size of economic holding. Scattering of holdings which is a concomitant of fragmentation of holdings is yet another ill from which the agriculture has constantly been suffering.

In the next chapter, which is the last of this part, an analysis of the pressure on land is attempted. For this purpose arithmetical, physiological and agricultural densities are examined. Very obviously the density analyses show tremendous increase in the pressure on land and a substantial reduction in the areality indices of each type.

In the light of the foregoing analysis certain conclusions are drawn which constitute the third part of the thesis. In brief the conclusions are that the population has, since 1931, entered a stage of sustained and steady increase; the urban population is increasing faster than the rural population and by all probability appears to accelerate its growth - rate still further; as a concomitant to progressive character the juvenile dependency is very high and is most likely to become higher still in near future; the proportion of non - earning and earning dependents is considerable whereas the

secondaries are rather insignificantly developed and suffer from lack of diversification; there is very little co-ordination between the agricultural and non - agricultural occupations; and the agriculture has failed to keep pace with the population thus increasing greatly the pressure of population on land. In the light of these conclusions a few suggestions are made which emphasize that side by side with family planning compaigns there is great need for the development of medium and small towns of specialized non - agricultural functions directly helpful for the augmentation of agriculture, for a well planned rational co-ordination between industry and commerce on the one hand and the agricultural operations on the other, for a comprehensive survey and planning of both the agricultural and urban land utilization and for the extension of banking, sales organization and other similar services to the rural areas.

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OCTOBER 1968

C O N T E N T S

P R E F A C E

One of the most important items in the study of geography of an area is the people of that area. The elements of physical environment get value and meaning only by the wants and efforts of the people. Continued human efforts for the appraisal of geographic potentials are the basic source of human society and culture. Every thing that is done for the satisfaction of human need - primary, secondary, tertiary and all - adds material to the culture and society and is, in reciprocity, conditioned by the character of the existing order of human life. Human culture, which is an aggregate of the things done by human associations in different fields of life or an organic association of specific types of craftsman--ship is a dynamic indicator of the relationship which people have established with their environment by their own undertakings. When once a pattern of culture and society is developed it becomes an effective force propelling and guiding further efforts for more and better appraisal of the environmental opportunities. Thus a perpetual process of action and reaction is set in between the society and the surroundings: the prime mover in this process is man. Every thing which is done in this perpetual process is done by man and for the service of man and their society. If the outline of this process is shaped by the pattern of the existing society its dynamism is directly affected by such aspects of the population as the number of persons involved, the rate at which they are increasing or decreasing, the pattern of their age-group and sex-composition the nature of their distribution over the area, the

proportion in which they are divided among professional and urban and rural classes and the like.

Since for an intelligent social planning it is basically essential to know as exactly as possible the people for whom the planning is to be done, the frame-work of the society within which it is to be fitted and the chief raw materials it has to draw upon it may be contended with justification that comprehensive and regionally arranged information regarding the afore said aspects of population and the character and extent of the available raw materials would surely be of great importance and practical utility for any country or region and especially for a developing one. The importance of the study of various aspects of population for matters of public policy is immense not only when it is made at the broad national level, but also when it is carried out at the state and congregational district levels. Infact the study with reference to smaller areas is of greater utility as it may be carried to such finer details which are not possible to touch when the area is big.

For this reason a small congregational district area, the Upper Ganga-Yamuna Doab, comprising four districts of the State of Uttar Pradesh has been selected for the study of trends and characteristics of the population. The half-century period from 1901 to 1951 is adopted for this study. The pattern of trends of population is not a point oriented matter on the scale of time: it is infact an outcome of a steady and protracted process involving both the human genesis and the dynamism of resource appraisal. Thus for a reasonably reliable assessment of the trends

of both the number and composition of the inhabitants of the Upper Doab the first half of the present century seems quite adequate for a number of reasons. In the first instance, the beginning of the twentieth century marks also the beginning of really reliable and detailed census enumerations. Secondly, this period encompasses a number of troughs and crests of rainfall and other elements of climate. Thirdly, the effects of some abnormal vissicitudes of both physical and human origin such as the break of epidemics, the two world wars and the division of the country into two sovereign states are markedly reflected in the trends of population during the fifty years. And fourthly, during this period of fifty years considerable developments have taken place in the establishment and growth of industries and commerce, in the efficiency and availability of public health services and in the growth of towns and urban population all of which have played important role in conditioning the trends and the involved problems of population in the Upper Doab region.

The principal objective of this study is to make a regional analysis of the growth, distribution and composition of the population of Upper Doab and to see whether the effect of the changing population on the basic economy of Upper Doab has been in the direction of securing a better balance between the human wants and the natural resources of the region. The justification for singling out agriculture for special reference is quite evident. The agriculture has been the core of the economy of Upper Doab (as it has been of any other part of the state) for millennia of the past history. Under the long historic inertia agriculture has gained

the privilege of providing the most significant thread in the " Warp and woof" of the regions economy. It may, therefore, be contended that the study of the trends of population vis-a-vis the progress of agriculture might be useful for a clear understanding of the nature and state of balance between the people and the basic resources of the region.

* * *

The world and infact every sizable part of it is passing through the most critical period of human history in which the present is confused and the future uncertain and obscure. Of all the major challenges confronting the contemporary world the gravest and the most threatening is from the number of human race itself. It is an irony of fate yet it is real: The quantity is threatening the quality and the present is endangering the future. The present crisis is that of a severe conflict between fulfilment and frustration. Longing for fulfilment of human needs is natural and must be satisfied but the population numbers increasing faster than ever are denying the desired and are causing frustration with growing tempo.

The confusion caused by growing population is tragically confounded by a craze for living in cities and towns and for the pursuits of cash and capital earning occupations. Artificial and sophisticated living is badly dissipating the much wanted pursuit of the plenty which should mainly concentrate on the efforts to produce more and more from the natures reservoir which is basically stored in the form of soil and water.

The crisis thus assumes another form. It is that in which the secondary is replacing the primary or the artificial is prevailing over the real. The

early balance between the rural and urban economy is ruthlessly shattered and the human society and the economy is mercilessly strained by most uncomparingly rapid and enormous growth of urbanization and urban population. The telling effects of such an imbalance assume greater proportions in regions where the rural and agrarian economy is deep rooted, traditional and the very basis of the social and cultural structure.

* * *

Though the Upper Ganga-Yamuna Doab is in areal measures only an speck in the world but the population situation of the region is basically not different from what it is recognised to be in the world perspective. During the half - century period of 1901-51 the population of the region has increased at a mean rate almost equal to the average rate for the world and because of high predoninance of lower age groups it is almost sure to speed up its rate of growth. Urban population has increased about twice as fast and its growth-rate is likely to accelerate further as the urban population is equally, if not more, progressive. The occupational structure is conspicuous for lack of organized co-ordination between the agrarian and the non - agrarian and huge proportion of human force is occupied in miscellaneous services whereas the burden of juvenile and feminal dependency is high and ever increasing.

The situation seems rather gloomy and really threatening beset with living dangers yet no one who is dedicated to read the signs of time and realise the potentials inherent in the land and human force can fail to see the glimpses of genuine fulfilment, satisfaction and happiness which could be achieved through realistic approach to the problems of population. One

requisite of such approach is an analytical understanding and assessment of the trends of various aspects of population. The present study is a modest attempt to make a regional analysis of the population dynamism of Upper Ganga-Yamuna Doab with special reference to the situation and progress of agriculture in the region. If the work succeeds in contributing in some measure to the understanding of the problem inherent in the growing population vis-a-vis the state of agricultural progress the labour will be rewarded.

In conclusion, I take it as a pleasant duty to express my grateful thanks to Professor Mohammad Shafi for the great inspiration and encouragement which I received from him and without which, I am sure, the present work would have never been accomplished. My thanks are also due to Messrs. Jamil Ahmad Khan and Mazhar Ali for their valuable assistance in the preparation and photostating of the maps and diagrams. I am greatly indebted to Mr. Izhar Husain who very willingly prepared the first type written copy from the manuscript and to Mr. Niaz Ahmad Khan who prepared the final typescript. I owe a loving gratitude to my younger brother Mr. S.M. Habibullah who smilingly endured all the labour and inconvenience of reading the proofs of the final script, of arranging and setting the maps and diagrams and of getting the binding of the thesis so nicely done.

August 16, 1968 S.M. Rafiullah

LIST OF MAPS AND DIAGRAMS

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P A R T I

THE PHYSICAL ENVIRONMENT

CHAPTER I

STRUCTURE AND RELIEF

The Upper Ganga-Yamuna Doab[1] which comprises four district namely Saharanpur, Muzaffarnagar, Meerut and Bulandshahr, occupies an area of 8,021 square miles[2] or 20544 square kilometres. The region extends between 28° and 30° north latitude and 77° and 78 30 east longitude and forms the north-western part of the state of Uttar Pradesh (Fig. 1). It has a maximum length of about 162 miles (259 kms.) and a maximum breadth of about 62 miles (99 kms.) while the average length and breadh are about 140 and 57 miles (224 and 91 kms.) respectively.

Structurally the Upper Doab is a part of the Great Indo-Gangetic plain of northern India. This Great Plain is a vast area of alluvial deposits extending over about 1500 miles (2400 kms.) from east to west and 250 miles (400 kms.) from borth to south. The alluvial plain occupies the synclinal basin between the Himalayas in the borth and the Deccan Plateau in the south and is composed of the sediments deposited by the Himalayan rivers.

Various hypotheses have been put forward to explain the origin of this Great Plain. Eduard Suess is of the view that the synclinal basin was a ' fore deep ' formed in front of the resistant archaic land mass of the peninsula during southward compression of the Tethyan sediments against the rigid peninsular block under the huge thrust of the southward moving block of General Asia.[3]

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1. 'Doab' is composed of two Persian words dō and āb which literally mean two and water respectively. The term Doab therefore signifies an interfluve between two rivers or " a tongue of land between two rivers (esp. the Ganges and Jumna.)" Chamber's Twentieth Century Dictionary, New Mid-century Version, p.310.
   For the sake of brevity the Upper Ganga-Yamuna Doab will, hereinafter, be referred to as simply Upper Doab.
2. Census of India 1951, Vol.II, Uttar Pradesh, Part II-A, General Population Tables.

PLATE I

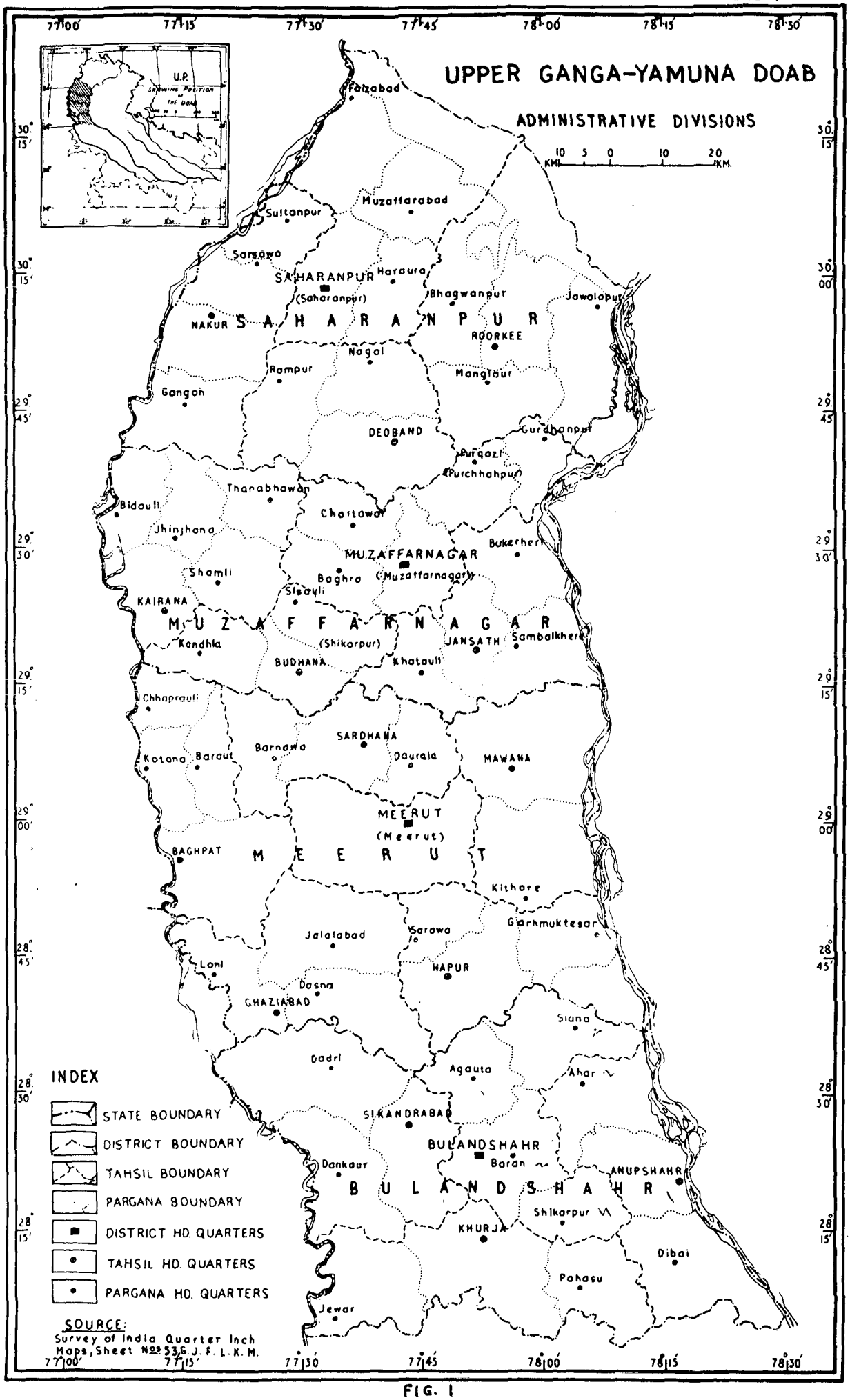
UPPER GANGA-YAMUNA DOAB
ADMINISTRATIVE DIVISIONS
10 5 0 10 20 KMS. KM.
U.P. SHOWING POSITION OF THE DOAB
77°00 77°15 77°30 77°45 78°00 78°15 78°30
30°15 30°00 29°45 29°30 29°15 29°00 28°45 28°30 28°15
Faizabad
Muzaffarabad
Sultanpur
Sarsawa
SAHARANPUR (Saharanpur)
Haraura
Bhagwanpur
Jawalapur
NAKUR
S A H A R A N P U R
ROORKEE
Nagal
Rampur
Mangtaur
Gangoh
DEOBAND
Gurdhanpur
Purqazi (Purchhahpur)
Thanabhawan
Bidouli
Chartawal
Jhinjhana
Bukerheri
MUZAFFARNAGAR (Muzaffarnagar)
Shamli
Baghra
Sisauli
KAIRANA
M U Z A F F A R N A G A R
Kandhla
(Shikarpur)
JANSATH
Sambalkhera
BUDHANA
Khatauli
Chhaprauli
SARDHANA
Barnawa
Daurala
Kotana
Barout
MAWANA
MEERUT (Meerut)
BAGHPAT
M E E R U T
Kithore
Garhmuktesar
Jalalabad
Sarawa
Loni
HAPUR
Dasna
GHAZIABAD
Siana
Dadri
Agauta
Ahar
INDEX
STATE BOUNDARY
DISTRICT BOUNDARY
TAHSIL BOUNDARY
PARGANA BOUNDARY
DISTRICT HD. QUARTERS
TAHSIL HD. QUARTERS
PARGANA HD. QUARTERS
SIKANDRABAD
BULANDSHAHR
Baran
Dankaur
ANUPSHAHR
B U L A N D S H A H R
Shikarpur
KHURJA
Dibai
Pahasu
Jewar
SOURCE:
Survey of India Quarter Inch Maps, Sheet Nos 53 G. J. F. L. K. M.

FIG. 1

Burrard attributes the origin of the depression to parallel faults with a downthrow of about twenty-miles. Burrard's view has, however, not gained much favour as it is criticised to be based on geodetic observations and is not supported by geological investigations and findings.[4]

Wadia and Auden believe that the Great Plain was formed as a result of gradual subsidence of Archaean gneiss which took place to counter balance the uplift of the Himalayas and the consequent loading of the adjoining belt by heavy and continued sedimentation. The process of sedimentation and sinking continued with increasing vigour during the Himalayan orogenesis and ultimately the alluvial plain came into being. This view is mainly based on the evidence of the presence of the characteristic Gondwana rocks on the northern rim of the alluvial belt.[5] Though Glennie has raised doubt about this view but he himself has not put forward any hypothesis about the origin of the plain.[6]

The geological history of the plain dates back probably to the Upper-Eocene period when it began to develop in the form of a depression. By the Middle-Miocene the depression was fully developed and since then it has been filled by sediments brought down mainly by the Himalayan rivers and ultimately it assumed the form of a vast alluvial plain with a very gentle slope towards south and east.

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3. Suess, E., The Earth, Vol.IV, p.619 and Krishnan, M.S., Geology of India and Burma, 1956, p.57.
4. Burrard, S.G., The origin of Himalayan Mountains, Geological Survey of India, Professional Paper No.12, 1912, p.11 and Wadia, D.N. and J.B. Auden, Geology and Structure of North India, Memoirs of the Geological Survey of India, Vol.73, 1939, p.134.
5. Wadia, D.H., and J.B. Auden, op.cit. p.128.
6. Glennie, E.A., Gravity Anomalies in the Structure of Earth Crust Memoirs of the Geological Survey of India, Professional Paper No.27,1932, p.32.

The Alluvial Deposits

According to Wadia the alluvial deposits can be divided into two principal types namely (1) the older deposits forming the greater part of the Ganga plain and comprising the beds which are undergoing denudation and (2) the newer deposits, mainly found in the deltaic region, comprising the tracts where the alluvial formation is still active.[7] The newer deposits are also found in the immediate vicinity of river channels even in the areas where older deposits predominate.

The older deposits, known as bhangar, are generally composed of thick clay beds. These beds are usually replete with calcareous nodules (locally known as kankar) of varying size. Pisolitic concretions of hydrated iron peroxide are also found disseminated through the clay.[8] These ferrous concretions are quite common in the Upper-Doab districts and frequently occur in the reddish brown or yellow clay. Pebbles, gravels, and conglomerates are not a usual feature of the old deposits. However they are quite significant in the submontane and foothill zone and the beds of rivers and streams. The occurrence of sand varies inversely with the distance from the hills and the courses of rivers whereas compact sandstone is very rately found.

The character of newer deposits, known as Khadir, varies from region to region of the Great Plain. In the deltaic region, where these deposits are in great abundance, fine grained clay is most predominant. Along the courses of rivers sand and sandy clays are the chief deposits, pebbles also do occur but they are rather uncommon. In the submontane tract the khadir

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7. Extracts from the manuscript report by Theobald, on parts of the alluvial area in Bengal, Bihar, and North-Western Provinces (the old name of the present Uttar Pradesh) published in Geological Records, III, 17, (1870).
8. Oldham, R.D., A Mannual of the Geology of India, 1913, p.431.

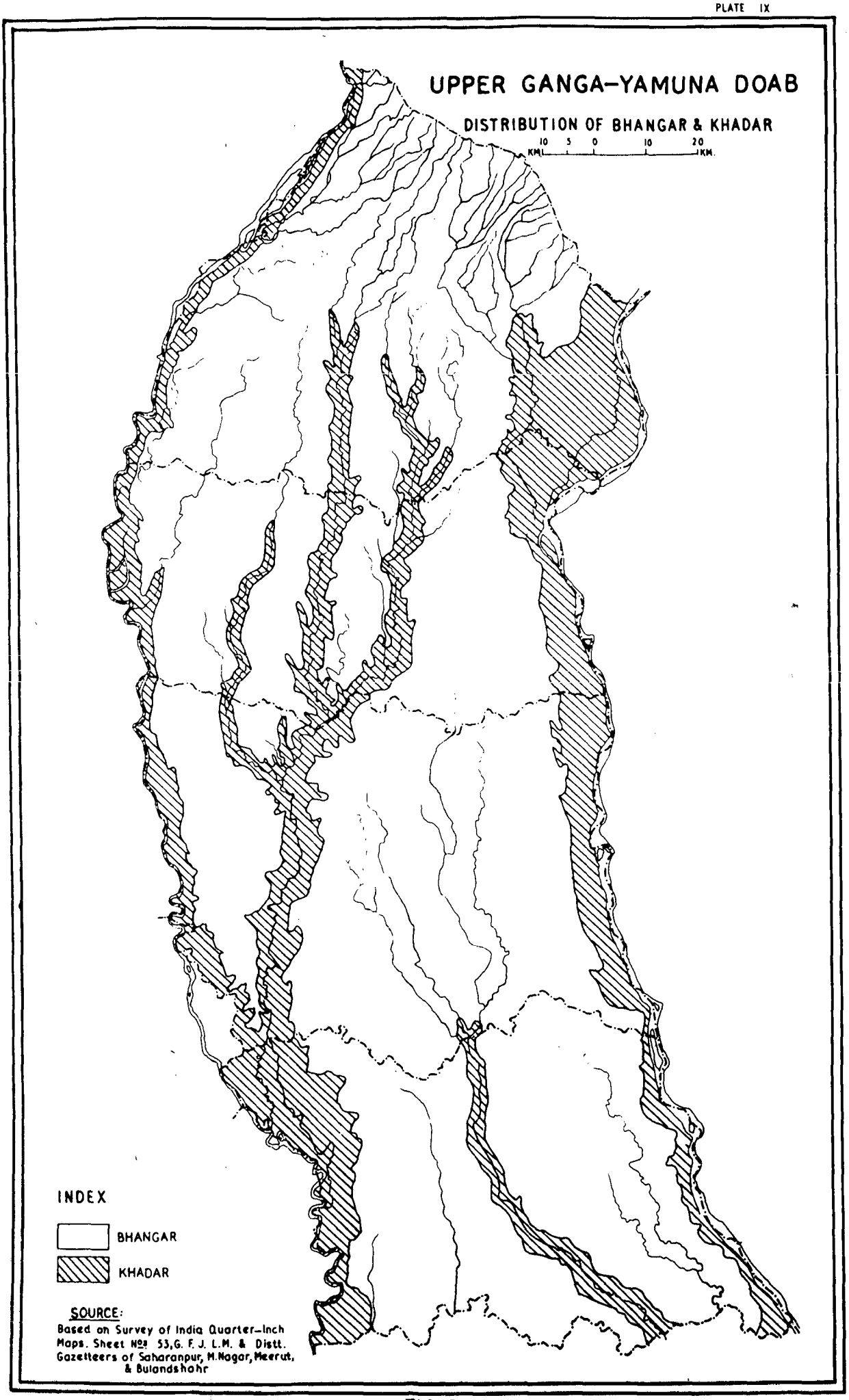
UPPER GANGA–YAMUNA DOAB
DISTRIBUTION OF BHANGAR & KHADAR
10 5 0 10 20
KM. KM.
INDEX
BHANGAR
KHADAR
SOURCE:
Based on Survey of India Quarter–Inch Maps. Sheet Nos 53,G. F. J. L.M. & Distt. Gazetteers of Saharanpur, M.Nagar, Meerut, & Bulandshahr

FIG. 2

deposits consist of sizable gravels of irregular shape but on the whole the khadir areas are characterised by the absence of gravels and the presence of lenticular formations in the soil.[9]

The Upper Doab is mainly composed of the older deposits. The newer deposits are very limited in extent and are confined to the close neighbour-hood of the river channels. Like the Grait Plain the Upper Doab area is also, therefore, divisible into two regions:

(1) The bhangar or upland region comprising almost 90 per cent of the area of Upper Doab

(2) The khadir or lowland region occurring in linear strips along the courses of rivers and occupying only about 10 per cent of the area of Upper Doab.

The distribution of bhangar and khadir is shown in Fig.2. The bhangar lands which are quite evenly distributed among the districts of Upper Doab are at a level of from 50 to 200 feet (15 to 60 metres) above the valleys of the rivers which divide them into several longitudinal belts of varying width and shape. The bhangar tract is usually flat without much noticeable unevenness. It is only in the vicinity of river banks that this evenness is broken by the existence of rivines and sandhills known as bhur. The abrupt scarps by which the bhangar lands terminate and the frequent occurrence of ravines in the neighbourhood of khadar tracts give a sure indication of the fact that the surface of the older deposits is under constant and active denudation. The denudation is chiefly due to the

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9. Krishnan, M.S., Geology of India and Burma, 1956, p.14.

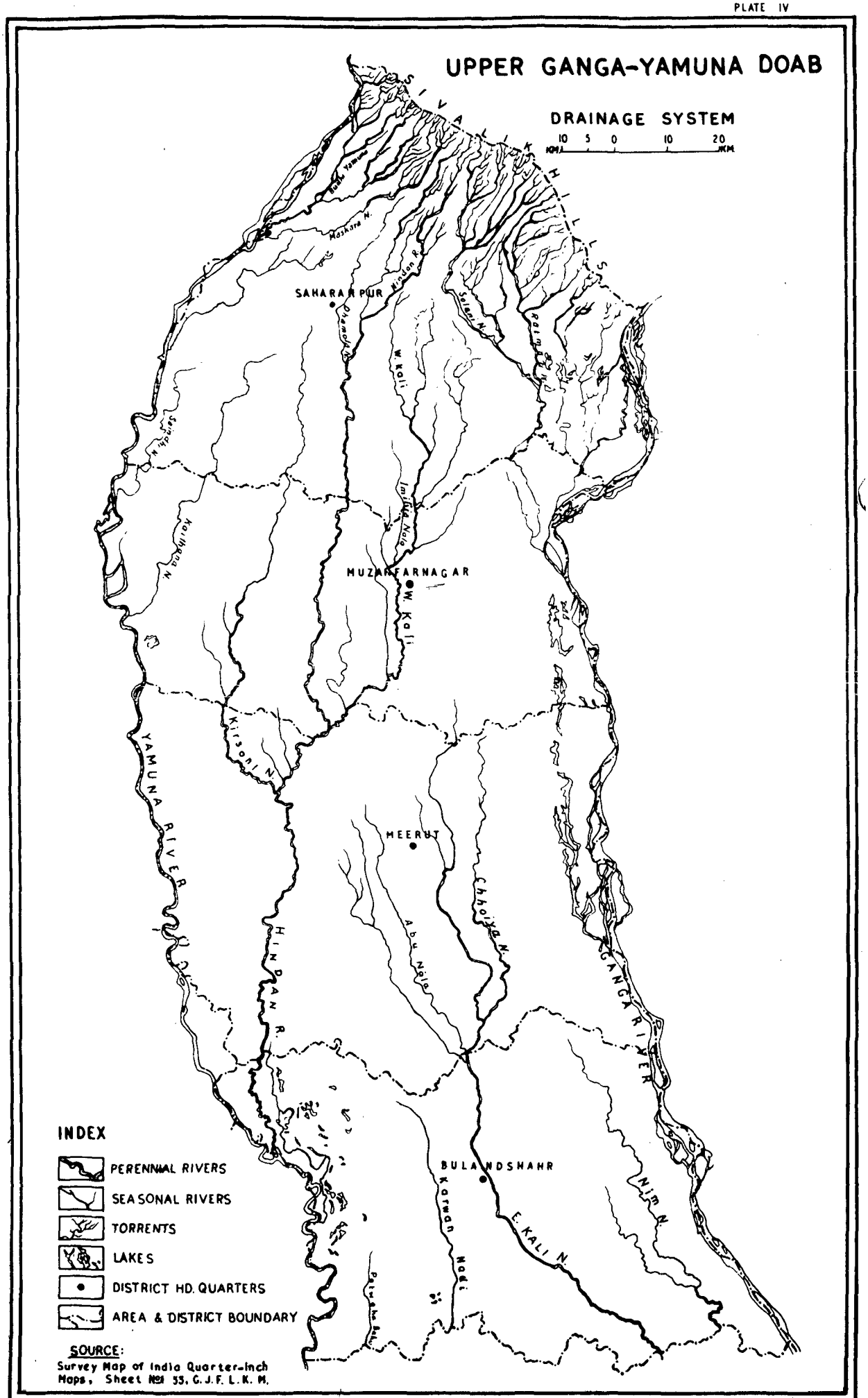
UPPER GANGA-YAMUNA DOAB
DRAINAGE SYSTEM
10 5 0 10 20
KM.
SIWALIK HILLS
Kali Yamuna
Maskara N.
SAHARANPUR
Hiranda R.
Solani N.
Ramganga R.
W. Kali
Jamuna R.
Hindan R.
MUZAFFARNAGAR
W. Kali
Kirsoni N.
YAMUNA RIVER
MEERUT
Abu Nala
Chhoiya N.
GANGA RIVER
HINDAN R.
BULANDSHAHR
Karwan Nadi
E. KALI N.
Nim N.
Patwahan Nadi
INDEX
PERENNIAL RIVERS
SEASONAL RIVERS
TORRENTS
LAKES
DISTRICT HD. QUARTERS
AREA & DISTRICT BOUNDARY
SOURCE:
Survey Map of India Quarter-inch Maps, Sheet Nos 53, G.J.F. L.K. M.

FIG. 3

mechanical work of rain water. The main rivers seem to have but very little hand in this washing away of the bhangar surface. This is evidenced by the fact that all secondary streams in Upper Doab follow courses quite similar to those of the principal rivers in stead of flowing into them by the shortest route from the bhangar (Fig.3).

The khadir areas are much limited in extent and are strictly confined to the banks of the rivers. The whole Upper Doab is traversed by four principal strips of khadir deposits associated with the four main rivers namely Ganga, Yamuna, Hindon, and East Kali Nadi. Ganga khadir is by far the broadest of the four. It attains a maximum width of about 10 miles in the south-eastern part of pargana Jawalapur in Saharanpur district and the north-eastern part of pargana Gurdhanpur in Muzaffarnagar district. Other khadir belts are generally narrow with breadths rately exceeding 3 miles (or 5 kms.). The khadir deposits vary from pure sand along the river banks to silt and silly clay in the valleys of the rivers. Gravels are found only in the vicinity of the siwalik hills in parganas of Jawalapur in the east and Faizabad in the north-west of Saharanpur district.

DRAINAGE

The drainage of Upper Doab comprises two main systems namely the Ganga and its tributaries and the Yamuna and its confluents. Ganga and Yamuna are the perennial rivers whereas their tributaries are very much seasonal in character. All these rivers and streams flow from north to south following the general direction of slope of the region as shown by the contours in Fig. 4.

PLATE III

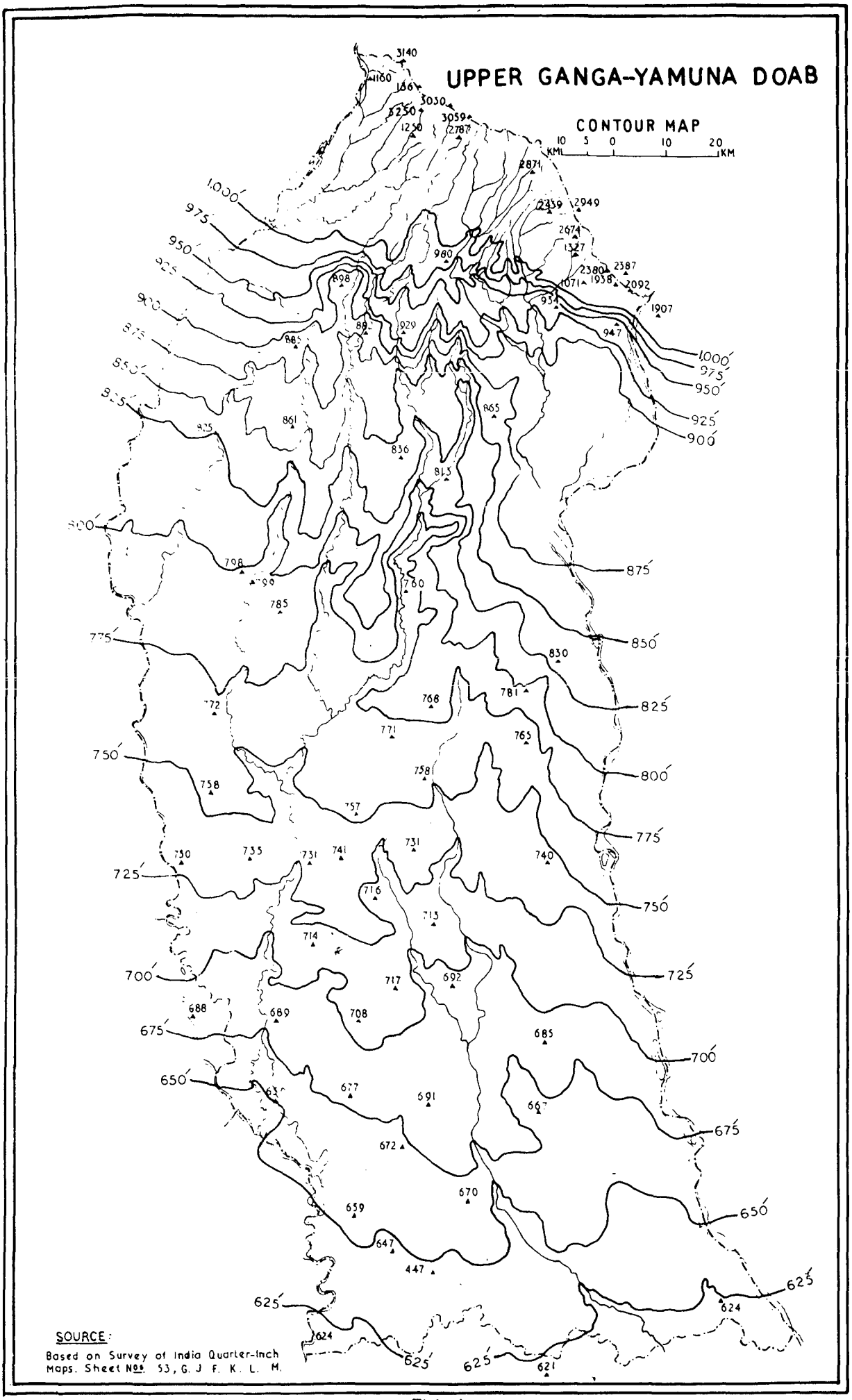

FIG. 4

The Ganga System

The Ganga system drains mainly the south-eastern section of Upper Doab. East Kali Nadi and Nim Nadi are the two main tributaries of Ganga in the region. Besides these two Solani, Ratmau, and Banganga also drain into the Ganga river as hill torrents in the eastern part of Saharanpur district (Fig.3).

After rising in Gangotri glacier the Ganga enters the Upper Doab plain at Hardwar through a well marked gorge in the Siwaliks. The river thenceforth flows through a number of meanders southwards forming the eastern boundary of Upper Doab districts. The river flows in a highly braided channel and is lined for the most part of its course in Muzaffarnagar and Meerut by a long but broken belt of lakes or jhils.

The water discharge of the river varies from season to season. It is at its minimum during the winter months due to the stoppage of the supply of thaw water from the Himalayan glaciers. From the middle of March the snow begins to melt and the volume of water in the river increases and usually attains its maximum during the month of August when the summer monsoon is in full swing. The normal discharge of water during winter months from December to February is around 6,000 cubic feet per second but during rainy season it rises to about 500,000 cubic feet per second. Occasionally extraordinary volume of more than 600,000 cubic feet has also been recorded.[10] In 1894 the water discharge rose to a record figure of

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10. District Gazetteer of Saharanpur, Vol.II, 1921, pp.8-11.

700,843 cubic feet.[11] This abnormal rise in the volume was caused by bursting of the dam at Gohna in Garhwal.[12]

The Ganga has frequently changed its course. The great change in the Ganga, which resulted in the formation of the khadir is said to have taken place about 1400 A.D. Evidence of earlier changes is also found in Timurs Memoirs.[13] The change of the course has been towards the east and was probably the cause of the formation of the great loop in the course of the river in Jawalapur pargana.

The Ganga has been dammed near Hardwar and the Upper Ganga Canal has been taken out. The canal has a discharge of about 10,500 cubic feet and feeds a number of distributories which provide irrigation water to the eastern tahsils and parganas of Saharanpur and Muzaffarnagar, eastern and central tahsils of Meerut, and eastern and western tahsils of Bulandshahr district (Fig.5).

The tributories of Ganga are for the most part torrential streams rising in the outer slopes of the Siwaliks and joining the Ganga either in Saharanpur or north-eastern Muzaffarnagar district. Solani, Ratmau and Banganga are the chief tributories in this section. Solani is at first a mere torrent but gradually develops into a river of some magnitude as it receives water from a myriad of torrential streams forming a dendritic pattern. The river flows in the south-easterly direction under the high bank that marks the eastern limit of the upland plain.[14] It has a very extensive khadir. The river is highly capricious and has often caused

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11. District Gazetteer of Saharanpur, 1922, p.11
12. District Gazetteer of Muzaffarnagar, 1922, pp.4-5.
13. ibid., p.2.
14. District Gazetteer of Saharanpur, 1922, pp.10-11.

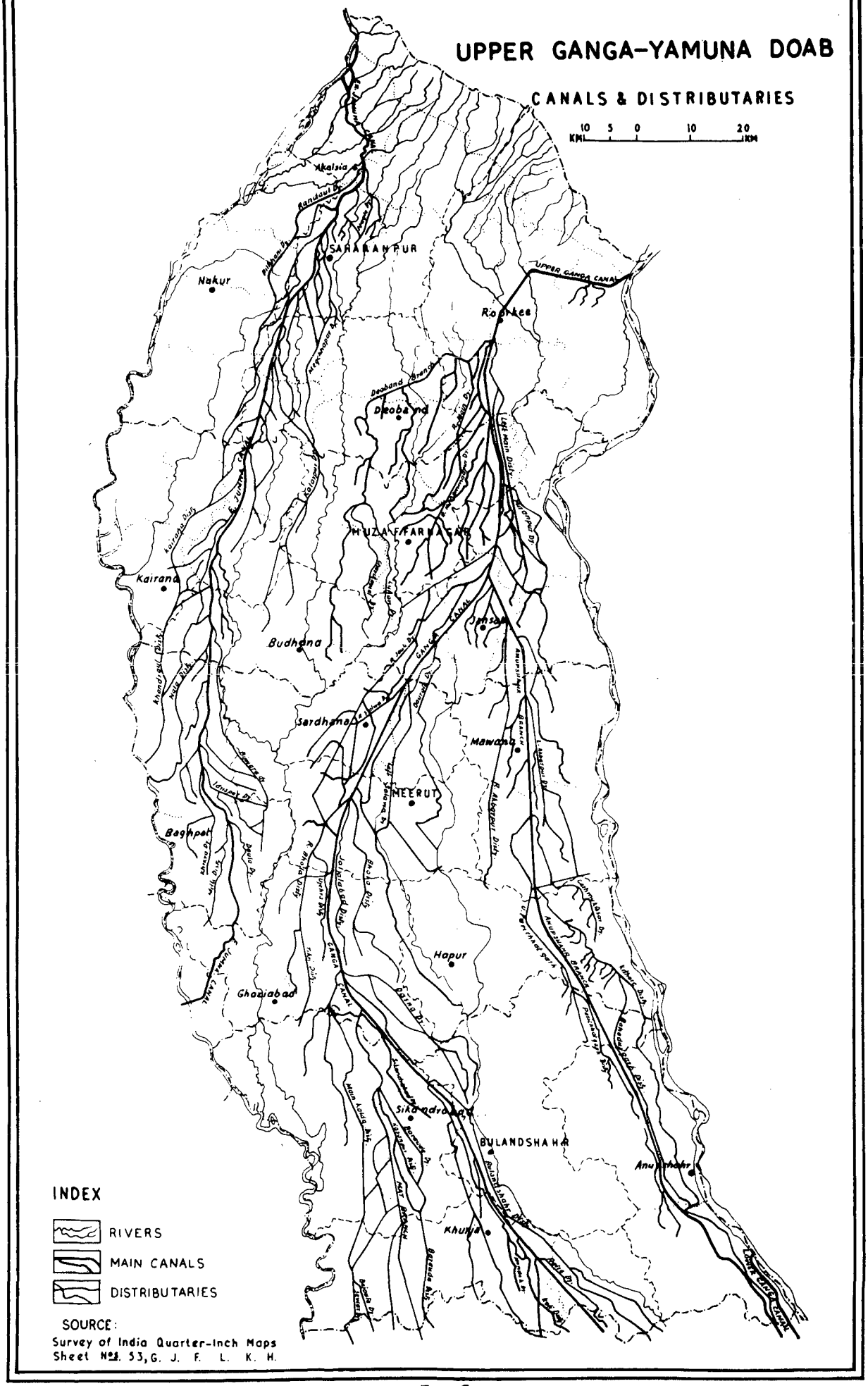
UPPER GANGA-YAMUNA DOAB
CANALS & DISTRIBUTARIES
10 5 0 10 20
KM KM
Nakur
SAHARANPUR
Roorkee
UPPER GANGA CANAL
Deoband
MUZAFFARNAGAR
Kairana
Budhana
Jansath
Sardhana
Mawana
MEERUT
Baghpat
Hapur
Ghaziabad
Siknderabad
BULANDSHAHR
Khurja
INDEX
RIVERS
MAIN CANALS
DISTRIBUTARIES
SOURCE:
Survey of India Quarter-Inch Maps
Sheet Nos. 53, G. J. F. L. K. H.

FIG. 5

destruction to the adjoining villages. However the estates which lie outside the range of its destructive influence are of marked fertility.[15] During the summer monsoons the water discharge in the river rises to about 84,000 cubic feet per second.[16]

East Kali Nadi is other main tributary of the Ganga. It originates in the north-eastern corner of pargana Khatauli between the Ganga Canal and the main sandy ridge. At first it is an ill-defined channel but ultimately develops into a respectable river and drains the eastern Upper Doab and joins the Ganga in Fatehpur district in the southern section of the Lower Doab.[17]

The Yamuna System

Yamuna, the second major river of Upper Doab, enters the region at Khara about 123 miles (197 kms.) of its source in the Himalayas. The river forms the western boundary of the Upper Doab districts. The character of the stream rapidly changes from boulder-strewn rapids in the extreme north-west of Faizabad pargana to sluggist and braided channel with sand and mud deposits.[18] In the southern part of pargana Bidauli and northern part of pargana Kairana the river flows through many well developed meanders. Quite similar meanders are formed by the river in pargana Baghpat in Meerut and parganas Dankaur and Jewar in Bulandshahr. From Jewar the river enters into the Aligarh district.

The frequent changes in the course of the river in former days are evidenced by the frequent presence of backwaters and depressions in the

15. District Gazetteer of Saharanpur, 1922, p.11
16. Hyden, H.H. Burrard, S.G., and A.M. Heron, A Sketch of Geography and Geology of the Himalaya Mountains and Tibet, 1934, Pt.III, p.17.
17. District Gazetteer of Meerut, 1922, p.12.
18. District Gazetteer of Muzaffarnagar, 1922, p.14.

khadir, which still hold sufficient amount of water during the rains. Budhi Jamna is the most important of these backwaters and is utilized for Eastern Jumna Canal from khara as far as Nayashahr.[19]

The Yamuna was dammed near Faizabad and the Eastern Yamuna Canal was taken out in 1830. The canal with its numerous distributaries irrigates the western tahsils of Saharanpur, Muzaffarnagar and Meerut districts (Fig.5).

The Yamuna receives a number of small and large tributaries on its left bank within the Upper Doab region. Like those of the Ganga the northern tributaries are mainly hill torrents flowing from the foothills of the Siwaliks. Muskara, Punjna, Budhi Yamuna and Badshahi-bagh are the chief among the torrential arteries of drainage joining Yamuna in the north-western part of Saharanpur district.

Of all the tributaries received by Yamuna within Upper Doab, Hindan is by far the most important and is in fact the third principal river of the region. The Hindan begins as a hill torrent rising in the north of pargana Muzaffarabad. In its course through the plains Hindan becomes a full-fledged river and flows in a well defined bed flanked in most places by high and steep banks. At the border between Muzaffarnagar and Meerut it is joined by West Kali Nadi which in itself is an important river. About 10 miles (16 kms.) south of this confluence it is joined by another important tributary namely Kirsani Nadi. Thenceforth Hindan proceeds as a major river through the while breadth of Meerut district and ultimately joins the Yamuna at the border between Dadri and Dankaur parganas of Bulandshahr district.

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19. District Gazetteer of Saharanpur, 1922, pp.14-15.

TOPOGRAPHIC FEATURES

The Upper Doab region can be divided into the following four distinct topographic regions:

I. The Siwalik Hills Region

I I. The Submontane Region

III. The Upland Plains or the Bhangar Region

IV. The Lowlands or the Khadir Region

I The Siwalik Hills Region

The Siwaliks run in a south-easterly direction from the gorge of the Yamuna in the extreme north-west to that of the Ganga at Hardwar in the east extending over a distance of about 73 kilometres. The range is broadest in the middle and western part but is narrower in eastern section. The while range presents a highly serrated outline. The hills are generally rugged and abrupt on the southern side while the slope towards the Himalayas in the north is comparatively gentle and the whole range of the Siwaliks is separated from the Himalayas by a continuous reverse fault. With the exception of Mohand and Timli passes which connect Saharanpur with Mussoorie and Chakrata the passes which cross the range are generally very difficult of access and are seldom used. The range is traversed by innumerable torrents and streams which ultimately feed the main drainage arteries of Upper Doab. The surface soil is generally a thin vegetable deposit and carries a cover of sal and chir forests. Save the forest chokis and occasional huts of the forest workers the range carries almost no population.

II The Submontane Region

Immediately south of the Siwaliks lies the submontane belt which is locally known as ghar and corresponds to the bhabar tract of the districts on the eastern side of the Ganga. It is broadest in Bhagwanpur pargana and narrowest in the extreme north-west of pargana Faizabad. Throughout its length it is intersected by numerous torrents that come down from the Siwaliks. They are seasonal streams and become dry in hot season but during the summer monsoons these torrents carry considerable volume of water which is ultimately discharged into either the Yamuna or the Ganga. In the west the surface of ghar is relatively even but in the middle and eastern section the submontane tract consists of a series of high and broken spurs and plateaux which merge abruptly into the plains.

The surface soil is light and shallow overlying a deep stratum of stone and boulders which rises to the surface at various places. Formerly the submontane belt was covered with forest and jungle but since the beginning of the present century the ground in the western ghar has been cleared upto the foot of the hills for a distance of about 15 kilometres and is given to tillage. Like the bhabar in the east the ghar, too, is characterized by subterranean drainage. The water from the hill torrents sinks into the bed of boulders and flows southwards as subterranean streams for some distance before it emerges to the surface in the plains. This makes the construction of wells abhortively expensive if not absolutely impossible. The population is very sparse and unevenly distributed and as the soil is quite unsuitable for house construction the people generally live in wattle huts, which are

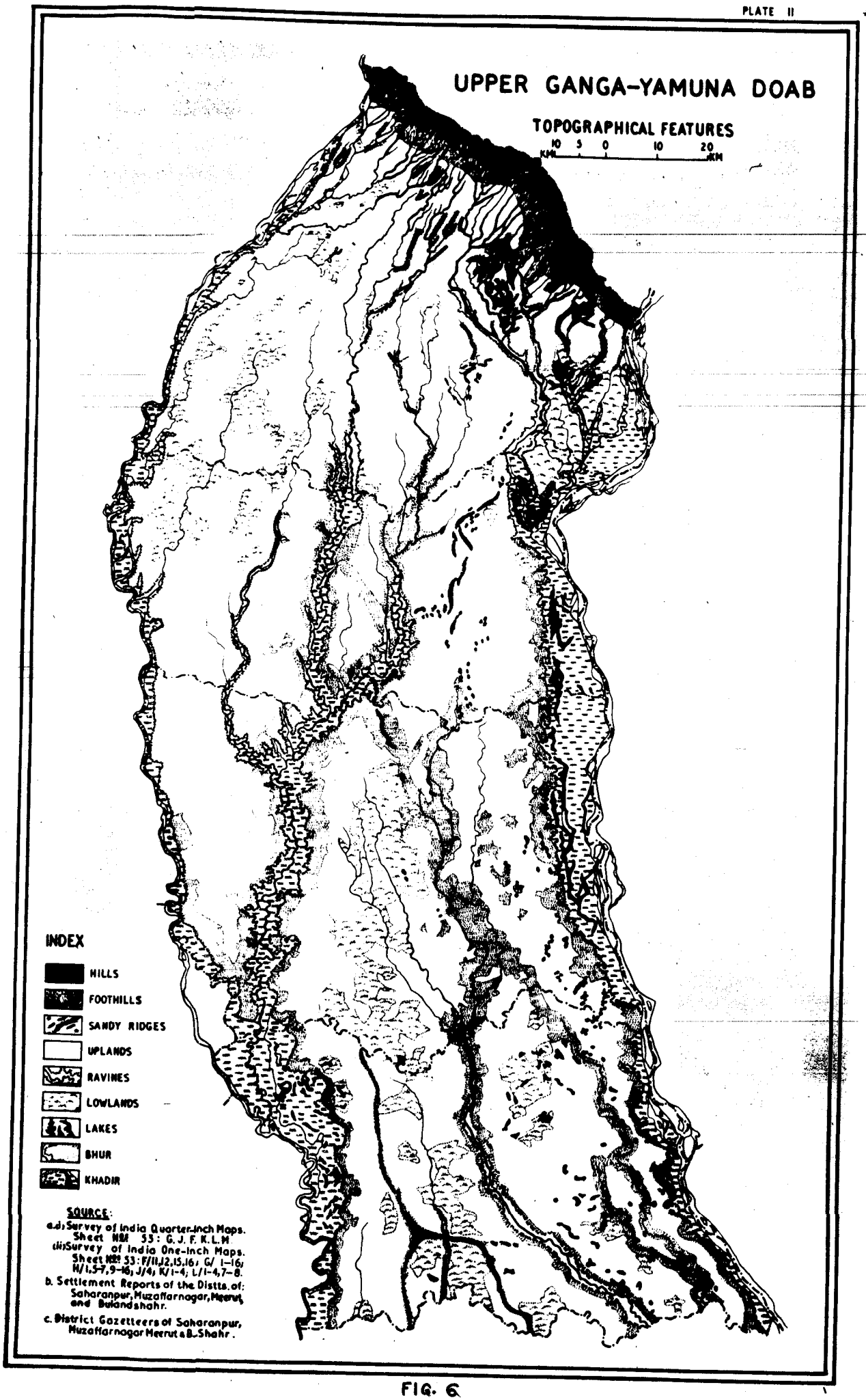
UPPER GANGA-YAMUNA DOAB
TOPOGRAPHICAL FEATURES
10 5 0 10 20
KM KM
INDEX
HILLS
FOOTHILLS
SANDY RIDGES
UPLANDS
RAVINES
LOWLANDS
LAKES
BHUR
KHADIR
SOURCE:
a.(i) Survey of India Quarter-inch Maps. Sheet Nos 53: G, J, F, K, L, M
(ii) Survey of India One-inch Maps. Sheet Nos 53: F/11,12,15,16; G/ 1–16; H/1,5–7,9–16; J/4; K/1–4; L/1–4,7–8.
b. Settlement Reports of the Distts. of: Saharanpur, Muzaffarnagar, Meerut, and Bulandshahr.
c. District Gazetteers of Saharanpur, Muzaffarnagar Meerut & B.Shahr.

FIG. 6

highly vulnerable to destructive fires during the dry summers. Though the rainfall is heavy but the nature of the terrain and slope is such that there is no danger of floods.

III The Upland Plains or the Bhangar Region

The upland plain region is by far the most extensive and covers almost 90 per cent of the surface area of Upper Doab (Fig.6). It is very much evenly shared by all the four districts of the region. These plains which represent the older alluvial deposits are 50 to 200 feet (15 to 60 metres) above the valleys of the rivers which divide them into a number of longitudinal belts of varying width and shape. These miniature interfluves thus make the whole region appear as a Doab of Doabs. The principal among these secondary Doabs are the Yamuna-Hindan, the Hindan-Kali, and the Kali-Ganga interfluves. The general appearance of the bhangar region is of a monotonous level plain with a rather imperceptible slope southwards. The monotony is, however, occasionally broken by the presence of depre--ssions, sandy ridges or bhurs (Fig. 6).

The Yamuna-Hindan interfluve covers tahsils Saharanpur, Nakur, Kairana, Baghpat, and Sardhana and western parts of tahsils Meerut and Ghaziabad. In tahsil Nakur and Kairana the surface is appreciably diver--sified by numerous depressions which run along the Katha Nala and the Saindhi Nala. But in tahsils Kandhla, Barnawa, Baghpat and Ghaziabad it is almost a featureless level plain (Fig.6). The interfluve is, for the most part, extensively irrigated by the Eastern Yamuna and the Upper Ganga Canals. Parganas Sultanpur, Sarsawa, Nakur, Gangoh, and Bidauli are conspicuous for lack of canal irrigation facilities (Fig.5).

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The surface soil is light and shallow overlying a deep stratum of stone and boulders which rises to the surface at various places. Formerly the submontane belt was covered with forest and jungle but since the beginning of the present century the ground in the western ghar has been cleared upto the foot of the hills for a distance of about 15 kilometres and is given to tillage. Like the bhabar in the east the ghar, too, is characterized by subterranean drainage. The water from the hill torrents sinks into the bed of boulders and flows southwards as subterranean streams for some distance before it emerges to the surface in the plains. This makes the construction of wells abhortively expensive if not absolutely impossible. The population is very sparse and unevenly distributed and as the soil is quite unsuitable for house construction the people generally live in wattle huts, which are

The water-table lies within 25 to 35 feet (7.5 to 10.5 metres) from the surface and is easily tapable by wells. The depressions which become marshy during the rains contain heavy clay and are usually given to rice cultivation. On the higher plains the soil is generally light containing about 70 per cent of sand in the bhur tracts adjoining the khadir belts of the Yamuna and the Hindan. On the whole the soil is fairly fertile though the western parts of these uplands in parganas Nakur, Gangoh and Bidauli are rather precarious and less productive. On the contrary the portion that lies in parganas Kandhla, Kairana, Barault, Barnawa, Baghpat, and Loni is one of the most fertile region of Upper Doab and consists of a fine black loamy soil.

The Hindan-East Kali interfluve comprises almost the whole of the parganas Sardhana, Meerut, Jalalabad, and Dasna and western parts of parganas Daurala, Sarawa, and Hapur in Meerut district and the entire parganas Sikandarabad and Khurja and eastern parts of parganas Dadri, Dankaur, and Jewar in Bulandshahr district. It is a much diversified upland plain of highly ill-defined drainage. In Meerut district it is traversed in the middle by a broad belt of depressions having an average width of about 6 kilometres. On the east and west this upland Doab is girdled by a continuous and fairly broad belt of bhur tract (Fig.6). Between the bhur and central depressions there lies on each side a long tongue of raised level plain of fine and rich loamy soil. The soil of the depressions is heavy clay and specially suited to rice

cultivation. On the whole the region is highly productive and prosperous and is adequately irrigated by the Upper Ganga Canal and its distributories.

The section of the Doab that lies in Bulandshahr district contains a long continuous line of sand ridges in addition to the depressions and is therefore topographically more diversified than its northern counterpart in Meerut. The series of sand ridges which begin from the Meerut border run almost due south upto the border of Khurja tahsil and thenceforth bifercate into two branches: one going due east for about 10 kilometres before veering towards south-east and proceeding to the boundary of Aligarh district; the second taking a slight turn towards south-west proceeds due south and enters the Aligarh district between Karwan Nadi and Patwaha Bahu (Fig.6). A number of isolated and detached sand ridges also occur here and there in Khurja tahsil. The central depression is quite wide in Khurja and Sikanderabad parganas. Because of the abundance of sandy ridges and depressions the upland plain in this part of Bulandshahr is much inferior compared with that of Meerut. Parganas Dankaur, Sikandarabad, Khurja and Jewar are rather precarious. Like Meerut in Bulandshahr, too, the upland plain is girdled on the east and west by a narrow belt of bhur tract running along the East Kali and Yamuna khadir.

The Kali-Ganga interfluve is a long narrow belt of upland which lies between the Ganga on the east and the West and East Kali Nadi on the West and extends over the entire length of Upper Doab. It includes parganas Roorkee and Manglaur in Saharanpur district; Gurdhanpur, Purchhapur, Khatauli and Jansath parganas and eastern part of Muzaffarnagar and western

parts of Bukherheri and Sambalkhera parganas in Muzaffarnagar district; western parts of parganas Mawana, Kothore, Garhmukteshar and Puth, and eastern part of Hapur pargana in Meerut district; and parganas Siana, Agota, Ahar, Baran, Shikarpur, Anupshahr, Dibai and Pahasu in Bulandshahr district. The whole surface is much diversified by the presence of numerous sandy ridges or bhurs and depressions (Fig.6). The sandy ridges begin from near Roorkee Railway Station and traverse the whole length of the Doab. Most prominent among these is that which runs in a continuous belt from near Pur Qazi through western Bukerheri and eastern Muzaffarnagar parganas to Khatauli pargana. In parganas of Meerut and Bulandshahr districts these sandy ridges are innumerable but detached and do not form continuous belts (Fig.6). These sandy undulations rise to a beight of 15 to 25 feet (4.5 to 7.5 metres) and are about 100 feet (30 metres) broad. The bhurs and depressions are found only in tahsils Meerut and Bulandshahr; they are particularly numerous in the latter. The tract is irrigated by the Anupshahr Branch of the Ganga Canal. The irrigation facilities do not extend to parganas Shikarpur, Baran, and Agauta and to the western parts of Dibai, Anupshahr, and Ahar parganas (Fig.5). The parganas of this interfluve are general low in agricultural prosperity and many of them are quite precarious.

IV The lowlands or the Khadir Region

Khadir Region comprises the ribbons of lowlands which run along the rivers. It is composed of newer deposits and receives silt and sediment washed out from the upland plains by the surface run off during the rains.

The principal khadir tracts are those which are associated with the Ganga, the Yamuna and the Hindan. Khadir belts of some importance are also found along the West Kali Nadi, the East Kali Nadi and the Kirsani Nadi (Fig.2). The khadir belt is generally separated from the upland plains by a belt of bhur which presents an abrupt and much dessected front. The khadir tract is usually composed of silt, sand, and clay and varies considerably in width. Yamuna khadir is by far the narrowest having an average width of about 3 kilometres. It is at its broadest after the confluence with the Hindan in the Bulandshahr district where its width average to about 10 kilometres. The breadth of the Hindan khadir is rather uniform and averages to about 5 kilometres. The portion of the Ganga khadir south of Bukerheri is of medium breadth of about 4 to 8 kilometres. But north of Bukerheri it is broadest and attains the maximum width of more than 20 kilometres in Jawalapur, Roorkee, and Manglaur.

Khadir occupying a level lower than the uplands is highly vulnerable to floods during rains and is mainly an abode of the pastoral nomads. The underground water-table is very high and during the summer monsoons it virtua--lly rises upto the surface and the whole khadir is changed into long ribbons of water-soaked and marshy land. Due to seasonal floods and very high watertable the formation of saline afflorescence is very common and wide--spread. Sand and silt abound in the peripheral and middle parts of the khadir whereas in the inner parts clay is the predominant constituent of the soil. Agriculturally the khadir tracts are usually classed as precarious and the cultivation is much limited both in extent and the variety of crops. They, however, contain some pastures which provide grazing grounds for the stock of the pastoralists. Because of general agricultural precariousness and liability to inundations the khadir region is rather thinly populated and is mainly inhabited by migratory people. The cultivation of vegetables

and melons is traditionally carried out on the peripheral belts of sandy soil.

CHAPTER II

CLIMATE

The climate of Upper Doab is of rather a continental type with fairly cold winters and very hot and dry summers. During winter season the ground temperature occasionally falls below feezing point whereas in summer months the temperature often rises above 100°F and occasionally above 112°F or so. The winters are generally dry and therefore the cold is more bitter than the usual average temperatures may suggest. The summers are also dry and usually associated with strong blazing winds locally known as loo. The winter winds are of continental origin and generally blow from west or north-west direction. In summer season on the other hand the direction of the winds is reversed: they are of marine origin and usually blow from either south-east or south-west. This riversal of winds is an outstanding feature of the region's climate and the winds are distringuished as dry monsoons and wet monsoons and the climate of Upper Doab is consequently characterized by a well marked seasonal rhythm.

The dry monsoons prevail during the winter and early summer months from mid-November to mid-June. The period of dry monsoons is accordingly divided into winter and summer seasons. The winter season usually begins from mid-November and lasts upto the end of February. After a brief transitional period of disturbed weather during March the summer season sets in at the end of March and extends upto the middle of June or the last week of that month.

The west monsoons begin from the third or forth week of June and last upto the middle of October. They are most active during July and August which are generally the rainiest months of the year. After a short transitional period of retreating monsoons from mid-October to mid-November the dry monsoons establish themselves and the winter season begins from the middle of November. Thus the whole year in Upper Doab is divided into three distinct seasons of winter (mid-November to February), summer (mid-March to mid-June), and summer rains (mid-June to mid-October) with two short periods of transition between winter and summer and the season of rains and of cold weather.

Winter Season

From the middle of November a relatively high pressure begins to develop over the plain of Upper Doab and the general movement of the air is from west or north-west. The northern and north-western winds become increasingly cold by the beginning of January as they come from the snow clad Himalayan Ranages. January is by far the coldest month of the year. The mean minimum temperature is $43^{\circ}.2$ F ($6^{\circ}.2$ C) at Roorkee and $45^{\circ}.4$ F ($7^{\circ}.4$ C) at Meerut.[1] The temperature obviously increases from north to south with the distance from the Siwaliks. If the temperature of Khurja be considered as approximately equal to that at Aligarh which lies about 22 miles to its south then the mean minimum temperature of January in the southern most tahsil of Upper Doab may taken as $46^{\circ}.4$ F(8°C). However the variation in temperature from north to south is not very marked and

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1. There are only two meteorological observatories in Upper Doab: one is at Roorkee and the other is at Meerut. The records of these stations are, therefore, the only statistical information about temperature and pressure conditions in Upper Doab. However, as these stations lie at a distance of 16 and 70 miles from the Siwaliks their records are fairly representative of the general character of the temperature and pressure conditions of the whole Upper Doab.

substantial though of course there are some sharp contrasts within Saharanpur district as the temperatures in the Siwalik and submontane belt are appreciably lower than those in the plains of the southern tahsils of the district.

The diarnal range of temperature is fairly high. The days are generally sunny and pleasantly warm but the nights are cold and in the later part of January and in early February heavy mist or fog often occurs late in the night and sometimes lasts for hours after sunrise. Occasionally the fog becomes so intensive and long continued that it causes damage to rabi crops.

The general direction of winds, their velocity and character depends much upon the position of the stations relative to the Himalayas.[2] The winds are usually chilly and strong in the northern parts of Saharanpur but they are less so in the southern districts. Usually the night are relatively calm and the days are rather windy. The wind velocity increases rapidly from 8.00 a.m. to midday and remains constantly high upto about 3.00 p.m. and then decreases rapidly from about 3.00 to 7.00 p.m.[3]

During the months of January and February Upper Doab is visited by a number of depressions which most probably originate in the Medite--rranean Basin. These depressions bring some light to moderate showers to the region which are of immense value for the standing rabi crop. The approach of these depressions is heralded by a calm and warm weather.

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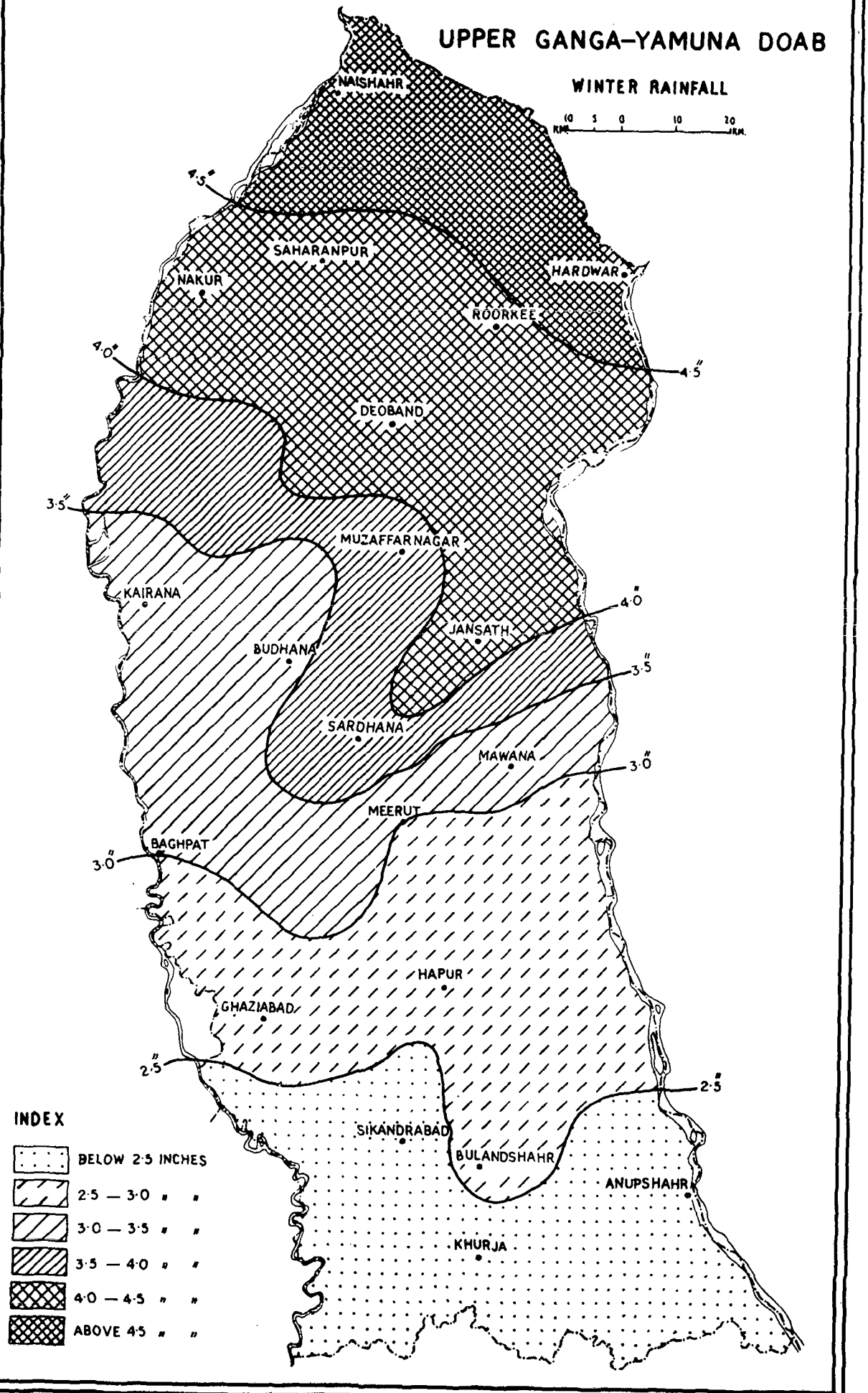
2. " Monthly and Annual Normals of Rainfall and Rainy Days." Memoirs of the Indian Metereological Department, Vol.XXVII,Pt.V, (Delhi, 1949), pp.152-54.
3. Eliot, J., " The Hot Winds of North India," Metereological Memoirs Vol.VI, 1884-1900, p.192.

With the arrival of the depression the temperature falls considerably, strong and cool westerly winds rise and thundering clouds gather over the sky. The cloudy weather is usually of short duration and generally lasts for a day or two and is followed by clear skies.[4] The winter rainfall gradually decreases southwards. It is heaviest in northern part of Sahranpur district where it is normally above 4.5 inches whereas in Bulandshahr district it is normally less than 2.5 inches (Fig.7). This winter rainfall though insignificant in amount is highly beneficial to the winter crops but it becomes very damaging when accompanied with hailstorms. Such hailstorms are not uncommon but they fall in very limited patches and for very short duration of about 15 to 20 minutes. The isolated hailstorms of great intensity often damage crops over considerable area.[5]

Summer Season

The summer season begins from mid-March and continues till the middle of June. The temperature begins to rise appreciably in the later half of the month of March. The mean monthly temperatures for March rise to about 66°F (18°.9 C) and 67°F (19°.4 C) at Roorkee and Meerut respectively while the mean maximum temperature during this month is as high as 84°F (28°.9 C) and 85°F (29°.4 C) at these two stations. The mean diarnal range is quite high being 27°F and 28°F at Roorkee and Meerut respectively. The temperature steadily increases during the subsequent months and May and June are normally the hottest months. The weather becomes distinctly dry, the relative humidity reduces from 42 per cent in

4. " Monthly and Annual Normals of Rainfall and Rainy Days",op.cit.pp.152-54.
5. Final Settlement Report of Meerut District, 1940; Statistical and Historical Account of the North-Western Provinces of India, Pt.I, Meerut Division, Vol.II, 1875; Report on the Revision of Records and Settlement Operations in the District of Saharanpur,1883.



Source of Data : Memoirs of the Indian Meteorological Deptt. vol XXII, pt. III

FIG. 7

April to 39 per cent in May.[6] The mean maximum temperatures in May at Roorkee and Meerut are 103°F (39°.4 C) and 106° F (41°.1 C) respectively while the mean minimum temperatures at these stations are 74°F (23°.3 C), 76° F (24°.1 C) respectively.

A hot dry wind locally known as loo is an important feature of the weather during May and June. These blazing winds invariably blow from north-west, west and south-west[7] and are sometimes so strong that they cause considerable damage to fruit trees such as mangoes and occasionally take heavy toll of human life also. Another feature of the hot weather is the occurrence of dust storms which usually rise in the afternoon. These dust storms are locally known as andhis. These storms are always accompanied by violent winds[8] and individual gusts may, in exceptional cases, attain a velocity as high as 100 miles per hour.[9] Sometimes they are also accompanied by small amount of rainfall which in any case rarely exceeds 2 inches. Such showers bring about temporary amelioration of the parching heat otherwise they are of no particular value to agriculture. On the whole the hot weather rainfall is considerably smaller than that of the cold weather. It is relatively high in Saharanpur where the average for the whole season is about 2 inches. The amount of rainfall gradually decreases southwards and the average for Anupshahr and Khurja amounts to 1.03 and 0.77 inches respectively.

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6. Walker, G.T., Table of Relative Humidity, Memoirs of the Indian Metereological Department, Vol.XXII, Pt. III, pp.462-63.
7. Blandford, H.F., Hot Winds of Northern India, Memoirs of the Indian Metereological Department, Vol.VI, No.6, 1886. pp.162-63.
8. Blandford, H.F., Climate and Weather of India, Ceylon and Burma, (London, 1889), p.81.
9. Hot and Dry Dust Raising Winds, 'Loo', Memoirs of the Indian Metereological Department, Vol.V, January 1954, pp.162-63.

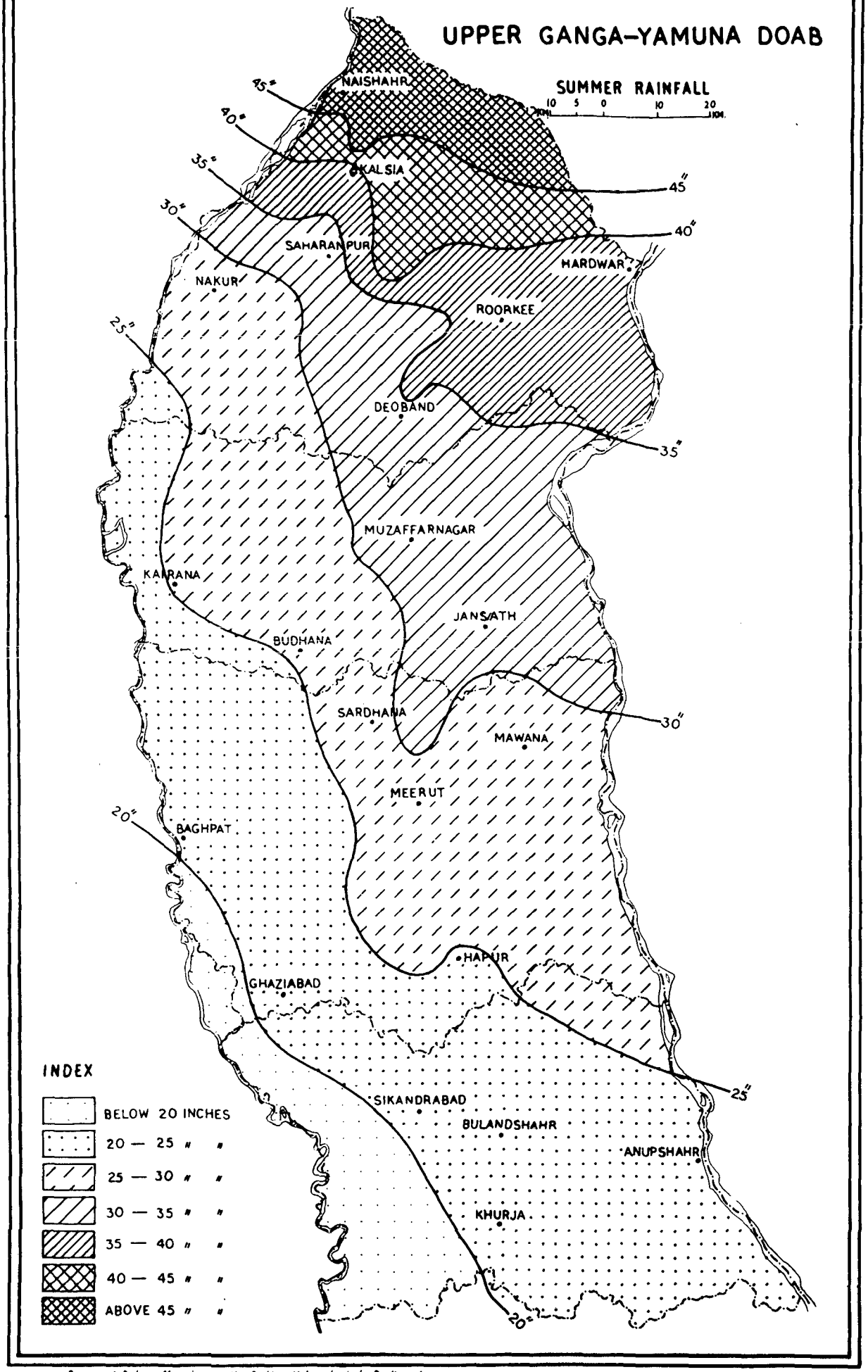
The Season of Rains

In Upper Doab the season of wet monsoons begins from the last week of June. With the arrival of fully developed monsoon currents appreciable fall in temperature occurs and dry parching wind is replaced by more pleasant humid wind. At the advent of wet monsoon the mean maximum temperature at Roorkee and Meerut drops respectively to 97°F (36°.1 C) and 100°F (37°.7 C) from 103°F (39°.4 C) and 106°F (41°.1 C) for the month of May. The rainfall is typically torrential and the months of July and August are punctuated with a series of short intervals, seldom lasting for more than a week, of clear sunny weather and cloudy weather with hammering rains. More than 50 per cent of the total annual rainfall is received during July and August which are definitely the rainiest months while nearly 85 per cent of the total rainfall is received during the entire period of the wet monsoons. Table I shows the absolute and percental distribution of rainfall in certain selected stations during the months of July and August.

TABLE I
ABSOLUTE AND PERCENTAL DISTRIBUTION OF AVERAGE RAINFALL IN CERTAIN SELECTED STATIONS DURING JULY AND AUGUST

Station	Total annual rainfall (in inches)	Rainfall in July and August (in inches)	Percentage of July and August rainfall to the annual rainfall
1	2	3	4
Naishahr	54.09	32.50	60
Saharanpur	37.02	20.20	52
Roorkee	40.07	22.48	56
Muzaffarnagar	37.73	19.30	51
Kairana	28.55	15.14	53
Meerut	32.92	17.20	52
Baghpat	24.34	12.15	50
Bulandshahr	26.40	13.43	51
Khurja	24.62	12.23	50

SOURCE : Memoirs of the Indian Metereological Department, Vol.XXII Pt.III



Source of Data : Memoirs of the Indian Meteorological Deptt. vol. XXII, pt. III

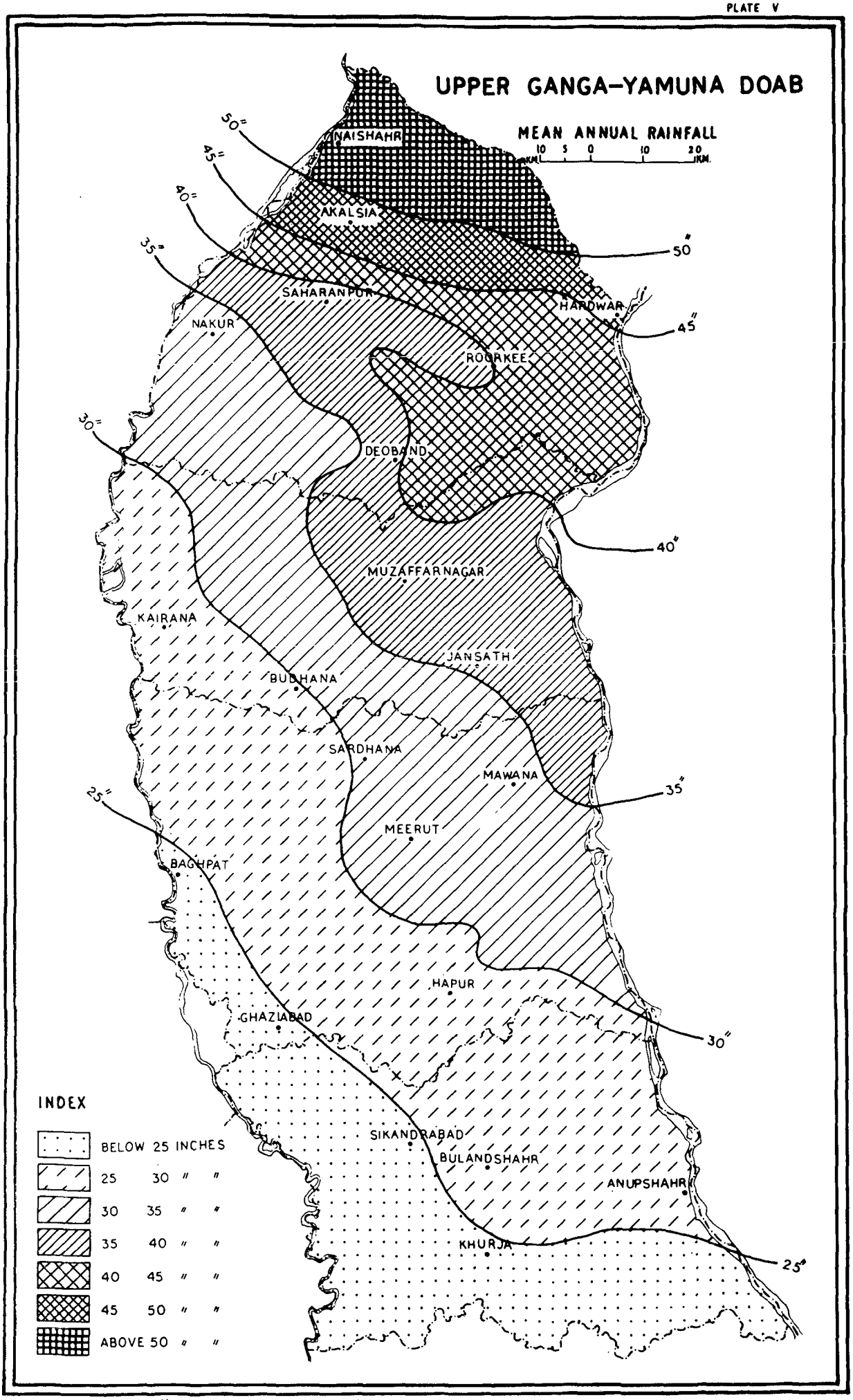
FIG. 8

Cloudiness is also maximum during these months and consequently the relative humidity is usually as high 80 per cent in July and 85 per cent in August at Roorkee.[10]

In September the wet monsoon current becomes feeble, the rainfall is much curtailed and the rainless intervals with very bright sun become longer. A slight rise occurs in the day temperatures. The mean maximum temperature for September at Roorkee and Meerut is 91°F (32°.5 C) and 94° F(34°.4 C) respectively which means a rise of 1°F and 2°F over the corresponding temperatures for August. The September weather is only gently breezy with intervals of calm and completely motionless air. Since the humidity is stillhigh being about 82 per cent[11] such periods of calm are terribly oppressive and quite often lead to the outbreak of a number of gastro-intestinal diseases. During September and October the region receives about 30 per cent of its annual total. This rainfall is very important for the sowing of the rabi crops and the quality and yield of the late kharif crops. Abnormally heavy falls in these months may cause water logging while premature cessation of the rains may prove detrimental to the sowing of the rabi crops.

In October the depressions over the plain of Upper Doab become weaker and less frequent.[12] The mean monthly temperature in October is 75°F(23°.9C) at Roorkee and 78°F (25°.5 C) at Meerut while the mean maximum and minimum temperatures at these stations are 87°F (30°.5 C) and 89° F (31°.7 C), and 61°F (16°.1 C) and 62°F (16°.5 C) respectively. This is the month of active retreat of the wet summer monsoons. By the middle of November the retreat

10. Walker, G.T., Monthly and Annual Normals of Relative Humidity, Memoirs of the Indian Metereological Department, Vol.XXII,Pt.III, 1914, pp.462-63.
11. ibid.
12. Spate, O.H.K., India and Pakistan,1957, p.47.



Source of Data: Memoirs of the Indian Meteorological Deptt. vol. XXII, pt. III

FIG. 9

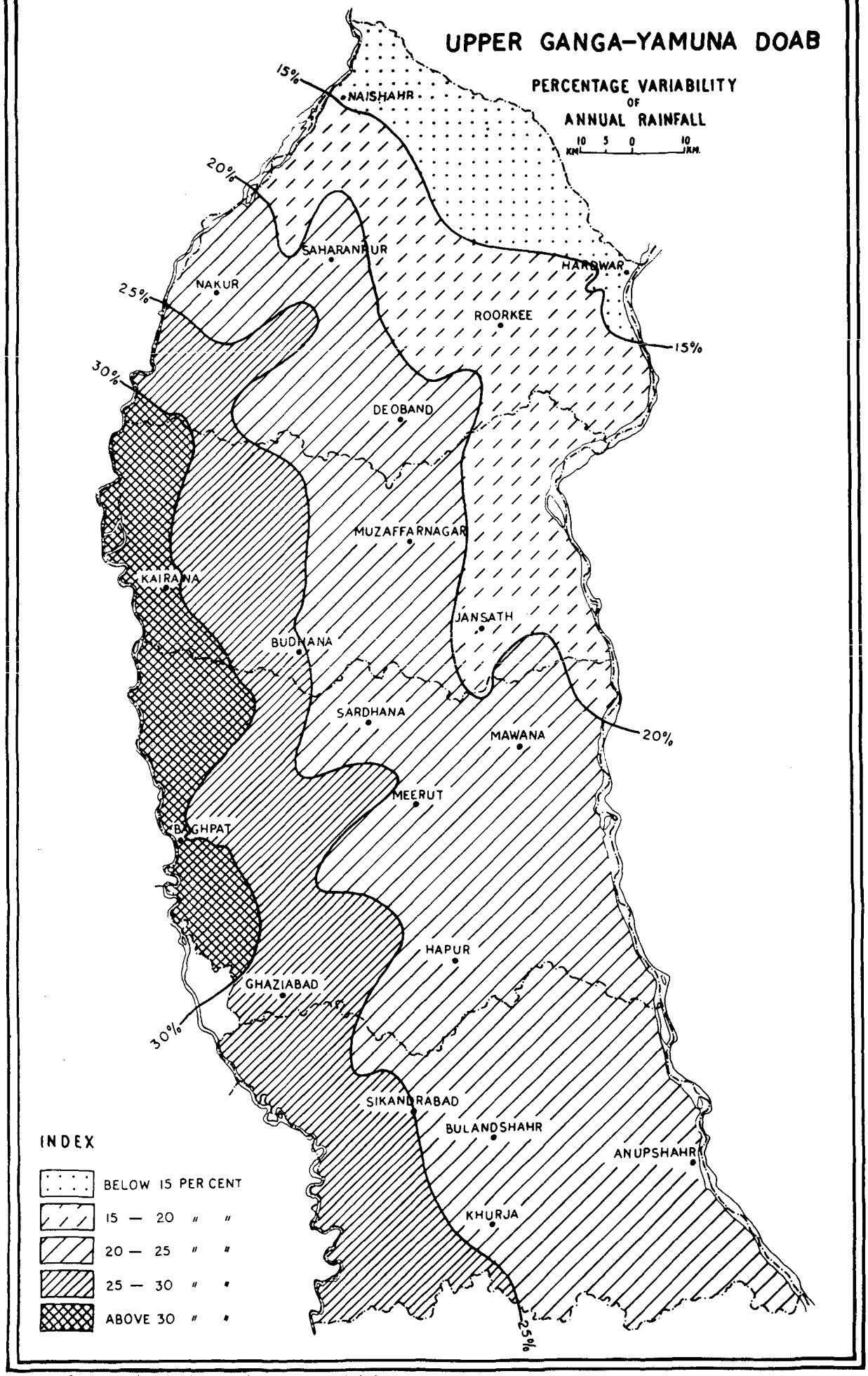
is complete and the winter monsoon begins to establish over the region. There is virtually no rainfall during November and the temperatures record further fall. The mean temperature for the month at Roorkee and Meerut is 65°F (18°.3 C) and 67° F (19°.4 C) respectively. The relative humidity also goes down substantially being 75 and 77 per cent respectively at these stations.[13]

On the whole more than 85 per cent of the total annual rainfall is received during the season of rains. This is clearly evident from table I-A which shows the annual and wet season rainfall for all the recording stations of Upper Doab arranged by districts. The pattern of distribution of the annual and the wet season rainfall is very much identical as shown by Figs.8 and 9. The rainfall gradually decreases from north to south and from east to west.

RAINFALL VARIABILITY

A fairly high variability is a characteristic feature of the rainfall of Upper Doab. The percentage variability of mean annual rainfall as shown in Fig.10 ranges between less than 15 to more than 30 per cent. From the compari-son of Figs. 8 and 10 it will be seen that the variability percentages vary inversely with the amount of mean annual rainfall. The lowest variability of a little less than 15 per cent is found in the submontane belt and its immediate vicinity in Saharanpur district whereas the highest variability of 30 per cent or more occurs in the western parganas of Muzaffarnagar and Meerut bordering on the Yamuna. According to Blandford's formulation that an annual variability of 12 per cent or more makes an area susceptible to famine[14] the whole of the Upper Doab is, therefore, highly vulberable to famines unless

13. Walker, G.T., op.cit.,pp.462-463.
14. Blandford, H.F., Rainfall of India, Memoirs of the Indian Metereological Department, Vol.III, 1886-88, p.130.



Source of Data : Memoirs of the Indian Meteorological Deptt. vol. XXII pt. III

FIG. 10

TABLE I-A

ANNUAL AND WET SEASON RAINFALL AND THE PERCENTAGE OF WET SEASON RAINFALL TO THE ANNUAL RAINFALL

Recording Station	Annual rainfall in inches	Wet season rainfall, June to Sept. in inches	Percentage of wet season to annual rainfall.
1	2	3	4
Naishahr	54.09	47.22	87
Kalsia	49.50	39.00	78
Hardwar	45.09	38.43	85
Saharanpur	37.02	31.20	84
Nakur	32.86	26.90	82
Roorkee	40.07	36.47	91
Deoband	40.54	34.35	85
Muzaffarnagar	37.73	32.52	86
Kairana	28.55	25.00	87
Jansath	35.96	30.54	85
Budhana	28.92	25.10	87
Sardhana	30.60	26.62	87
Mawana	33.40	29.23	88
Meerut	32.92	29.32	89
Baghpat	24.32	20.10	82
Hapur	28.39	24.90	87
Ghaziabad	24.70	21.11	85
Sikandarabad	24.84	21.90	88
Bulandshahr	26.40	22.44	85
Anupshahr	26.87	23.70	88
Khurja	24.62	22.10	90

S O U R C E : Calculations based on data from Memoirs of the Indian Metereological Department Vol.XXII,Pt.III.

adequate system of canals is provided to ensure water supply during periods of drought and protection against floods in the event of abnormally heavy rainfall. The famines were in fact very chronic and recurring in all the districts of Upper Doab until the whole region was provided with the existing net work of canals and distributories.[15]

From agricultural point of view the variability of rainfall during the wet monsoon season is of greater importance and far reaching conse--quences than the annual variability. It will be seen from table II that in the months of rainy season the variability is generally very high. June is the month of second highest variability when it is almost every--where more than 50 per cent and in certain places such as Mawana, Kairana, and Jansath rises above 80 per cent. In the months of July and August the variability is relatively less as the maximum variabiility index in July of 50 per cent obtained for Kairana is only 5 per cent above the minimum index of 45 per cent obtained for Saharanpur in the month of June. In August the variability ranges between 28 and 60 per cent and as such is a little higher than that of the month of July but is definitely much less than that of June. In September the variability is the highest as it ranges between 40 and 93 per cent. Though relatively low variabi--lity during the rainiest months namely July and August is a gratifying feature yet exceptionally high variability of September rainfall is of very great consequence to agricultural operations as the success and chances of a good rabi harvest very much depend upon its timely incidence.

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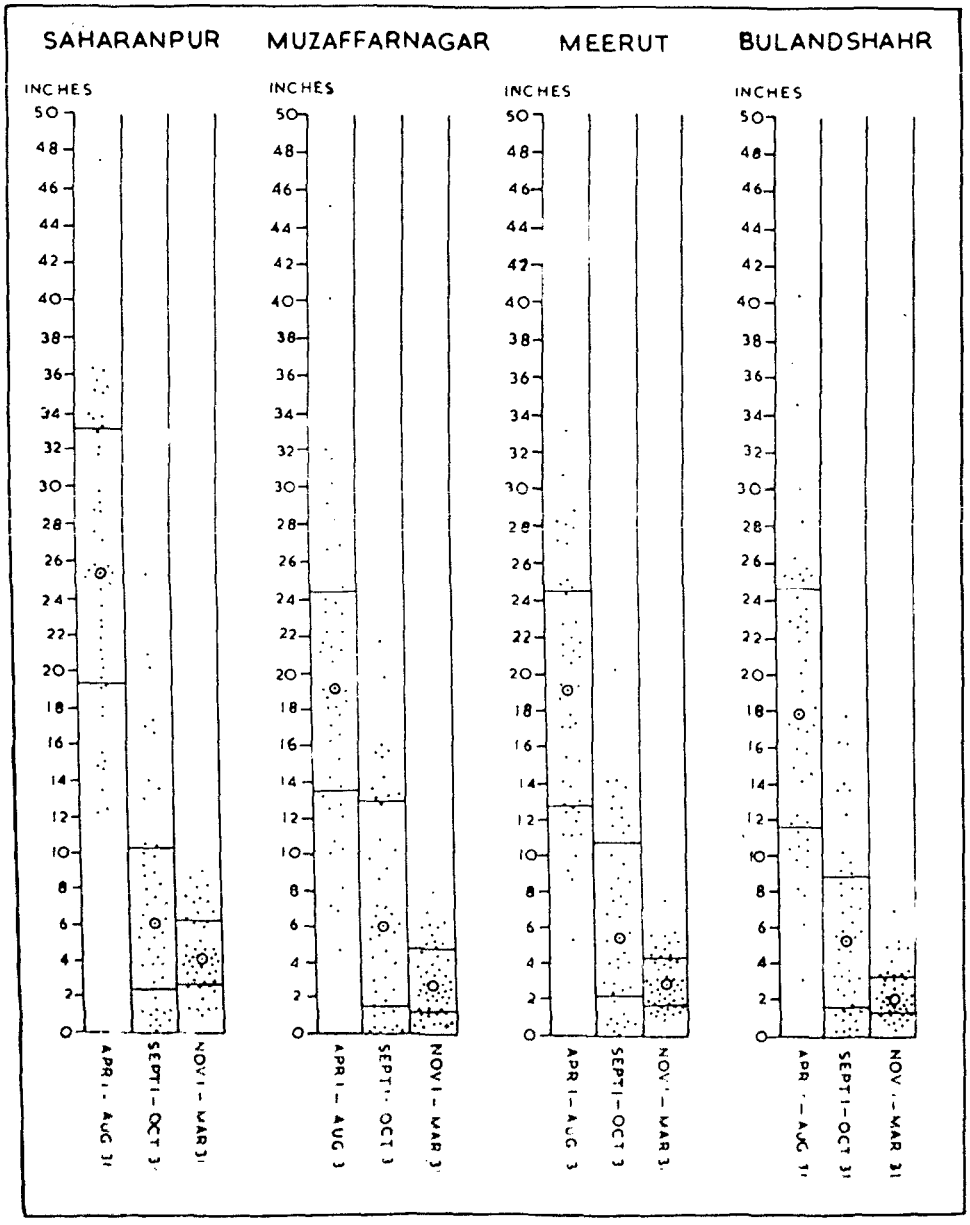
15. The details of various famines which have occurred in the districts of Upper Doab are given in:
    (i) District Gazetteer of Saharanpur, 1903, pp.69-75.
    (ii) District Gazetteer of Muzaffarnagar, 1906, pp.54-58.
    (iii) District Gazetteer of Meerut, 1901, pp.57-59.
    (iv) District Gazetteer of Bulandshahr, 1901, pp.48-52.

RAINFALL DISPERSION BY SEASONS 1905 - 1951



SOURCE OF DATA MEMOIRES OF THE INDIAN METEROLOGICAL DEPARTMENT

FIG. 10-A

The dispersion of rainfall in each district for the periods of summer, retreating and winter monsoons is shown in Fig.10.A. The annual and seasonal variability percentages calculated by median value method[16] for fifty year period are tabulated in table II.. It is evident from

TABLE II..

RAINFALL VARIABILITY AT SELECTED STATIONS FOR EACH MONTH OF THE WET MONSOON SEASON

Station	Percentage of rainfall variability in the month			
	June	July	August	September
1	2	3	4	5
Naishahr	51	28	44	84
Hardwar	50	29	41	78
Saharanpur	45	19	30	77
Deoband	51	35	43	73
Kairana	84	50	38	67
Jansath	81	21	28	71
Mawana	89	27	40	82
Hapur	53	35	44	93
Ghaziabad	74	47	60	40
Khurja	79	38	40	78

S O U R C E : Land utilization in Upper Ganga-Yamuna Doab; An unpublished thesis of Majid Husain, 1963, p.57.

Note: The variability percentages are based on median values and are checked by the author from the monthly rainfall records published by the Government of U.P.

16. Crowe, P.R., The Analysis of Rainfall Probability: A Geographical method and its Application to European Data, Scotish Geographical Magazine, Vol.XLIX, 1933, pp,73-91 and Monkhouse, F.J., and Wilkinson,H.R., Maps and Diagrams, Their Compilation and Construction 1952 pp.126-27.

Fig.10-A that the dispersion of rainfall is greater and more marked during the rainy season than it is during any other season. For instance in Saharanpur there were only 7 years in a period of 46 years when the rainfall was equal to or within one inch from the median value during the rainy season (April to August), whereas during the season of retreating monsoons (September to October) the number of years having median or near-median rainfall is obtained to be 10 and during the winter season this number becomes maximum being as high as twenty. In other words it means that the chances of having median or near median rainfall are the lowest in the rainy season and highest during the winter season. On the other hand, if the interquartile ranges are examined, they are found to be longest in the rainy season and shortest in the winter season. This is infact a corollary to the wider dispersion from and a closer congestion about the median values respectively. The high congestion around the median in the winter season is atonce impressed by the diagram (Fig.10.-A). Thus the assessment of variability on the basis of actual dispersion of rainfall amounts over the period of 46 years leads to the conclusion that the rainfall in the Saharanpur district is on the whole quite variable and is particularly so during the rainy season.[17]

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17. This impression of highest variability in the rainy season is not conveyed by the coefficients of variability calculated by the empirical formula used by C.F. Hounam (Monkhouse, F.J., and H.R. Wilkinson, op.cit. p.128). The formula defines the coefficient of variability as $\frac{\text{Inter-quartile Range}}{\text{Median}} \times 100$. According to this formula the variability indices for Saharanpur for the three seasons are found to be 55.1 p.c. (Ap.-Aug.), 131.1 p.c. (Sept. - Oct.) and 87.5 p.c. (Nov.-Mar.) which means that rainfall has the lowest variability in the rainy season and the highest in the season of retreating monsoons.

The general pattern of variability in the other three districts is very much the same as in Saharanpur district with the difference that the chances of the median or near-median rainfall decrease southwards with the decrease in the amount of rainfall. Thus in Meerut and Bulandshahr district the number of years having a rainfall within one inch of the median is found to be only three and in Muzaffarnagar district it is six against seven in Saharanpur. This shows that with the decline in rainfall the variability or chances of deviation from the median value tend to increase. The relative position of variability in various seasons is however the same. The rainfall having the highest variability during the rainy season (April to August) and lowest variability during the winter season (November to March).

An idea of variability may also be had from the inspection of the relative positions of the quartile and median values in the different seasons. Theoretically there is a major break in the rainfall between the summer and the retreating monsoon seasons as the interquartile band of the former is clear of that of the latter in all the districts of the region. However from the actual dispersion it may be easily seen that the chances of the season of retreating monsoons becoming as wetter as to equal or exceed the lower quartile values of the rainy season are fairly good or inversely, the chances of rainy season becoming as dry as to have a rainfall equal to or less than the upper quartile for the retreating monsoon season are quite appreciable. Muzaffarnagar district which has the greatest probability of drier seasons the chance of rainfall in the rainy season being lesser than the upper quartile for the retreating monsoon season is almost 19 per cent. In Bulandshahr and Meerut this percentage works to about eight. In Saharanpur district there is no likelihood whatsoever for the rainfall of the rainy season to become

equal to or to drop below the upper quartile for the retreating monsoon season. On the other hand the chances of rainfall of the retreating monsoon equalling or exceeding the median of the rainy season are about 2 to 4 per cent in the various districts. Thus it is amply evident that considerable variability in the rainfall of the region is indicated by the dispersion of actual rainfall amounts for the 46 years from 1905-06 to 1950-51.

From the co-ordination of the variability indices obtained from mean values and from dispersion of seasonal rainfall it may be seen that the rainfall in the Upper Doab region is highly variable and that variability is highest in those months and periods of the year when its regularity is most needed and as such the resultant fluctuations in the incidence and amount of rainfall have always been a matter of serious concern for the agriculture and the section of the population which depends directly on agricultural occupations for its livelihood.

CHAPTER III

SOILS

Systematic and detailed information and data about the types of soils of the districts of Upper Doab are still lacking despite the monumental work on Soils of India published by the Indian Council of Agricultural Research in 1963.[1] The main sources of information regarding the types of soil in such small administrative units as tahsils and parganas are the directories of District Gazetteers, District Settlement Reports, Final Reports on the Settlement of Land Revenue in various districts and the one-inch topographical sheets. Some maps of the soils of India have of course been prepared from time to time[2] but they are for the country as a whole and naturally do give more than a generalized treatment of the

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1. Raychaudhuri, S.P.., Agarwal, P.R., Datta Biswas, N.R., Gupta, S.P. and P.K. Thomas, Soils of India, New Delhi, 1963, pp. 383-397.

2. The first soil map of India was prepared by Z.J.J. Schokalsky for the International Society of Soil Science. His map was supplemented with the study of the National Conditions of Soil Formation in India, 1930. In 1935 Wadia, D.N., Krishnan, M.S. and P.N. Mukherjee published an Introductory Note on Geological Foundation of India and prepared a soil map published as plate XXV in the Memoirs of the Geological Survey of India, 1935. More recently in 1945 S.P. Raychaudhuri collected all the available data and prepared a soil map of the country which was published in the Bulletin of the National Institute of Science of India. No.3 1954. None of these maps give details of soil types and classification in Upper Doab.

soils of Upper Doab. The brief outline of the soil types in the region is therefore mainly based on gazetteers and settlement reports.

Broadly speaking the soils of Upper Doab may be grouped under 5 distinct types namely (1) loamy soils; (2) clayey soils, (3) khadir soils, (4) sandy soils, and (5) dark clay soils. The distribution of these types of soils in the region is shown in Fig.11. It will be seen from the map that loam is the most predominant type whereas the dark clay is absolutely confined to the submontane tract in Saharanpur district. The clayey soil is chiefly found in the depressions which occur in the upland plains or the bhangar tract. Sandy soils generally occur in long narrow ribbons usually running along the valleys of the rivers. Khadir soils are confined to the lowlands which flank the channels of the rivers.

Loamy soils

Loamy soils are composed of an admixture of sand and clay and are conventionally divided into a few varieties depending upon the percentage of sand in the soil. The light rich loam locally known as rausli contains considerable admixture of sand and is usually easily friable. Though in Saharanpur district the term rausli is used for all the soils which range from a light friable soil to the softer kinds of clay[3] in other districts it is generally considered to signify a sandy loam.[4] It is a somewhat coarse grained soil of light texture and consequently its moisture retention capacity is rather low but when provided with adequate irrigation water it is fairly suitable for the production of wheat and sugarcane.

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3. District Gazetteer of Saharanpur, 1903, p.6.

4. District Gazetteer of Meerut, 1922, p.37

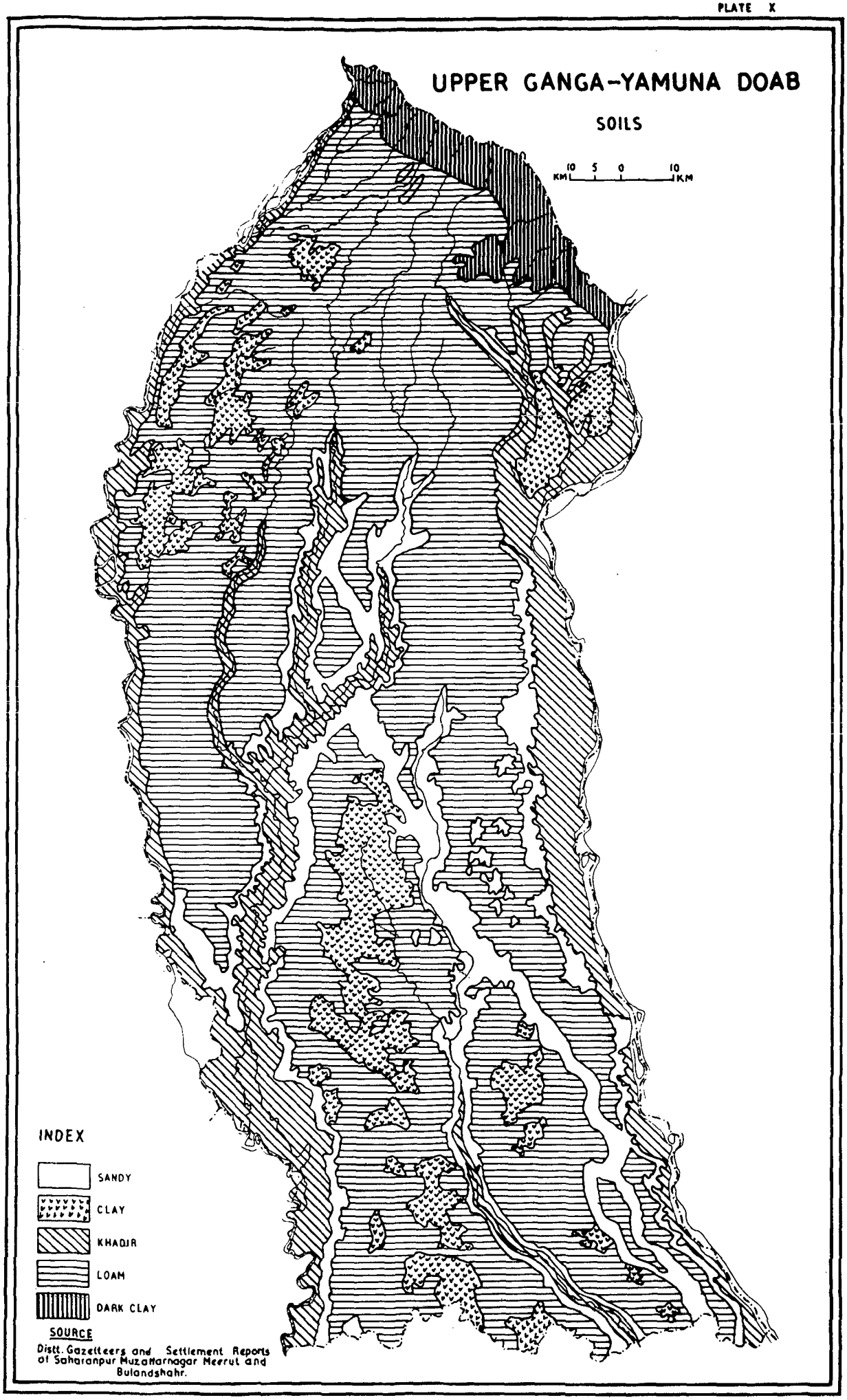
UPPER GANGA-YAMUNA DOAB
SOILS
10 5 0 10
KM KM
INDEX
SANDY
CLAY
KHADIR
LOAM
DARK CLAY
SOURCE
Distt. Gazetteers and Settlement Reports of Saharanpur Muzaffarnagar Meerut and Bulandshahr.

FIG. 11

Major part of the cultivated upland in Saharanpur is assessed as rausli soil ranging from light rich loam to the softer kinds of clay.[5] In Muzaffarnagar district it accounts for a little over 22 per cent of the cultivated area and is principally found in the eastern tahsils.[6] In Meerut and Bulandshahr too, it is mainly confined to the tahsils of East Kali-Ganga interfluve and approximately covers 30 and 15 per cent of the cultivated area of these districts respectively.

A superior variety of loam is seota. It is a rich loam or mould which is of white or light grey colour when dry but becomes of a very dark rich deep colour when moistened.[7] It is assessed as the best soil of the region and with adequate irrigation facilities is reported to give highest yields of a variety of crops. However, it varies much in fertility being very fertile where it is firm and least mixed with sand but it is rather poor in fertility where it contains some sand.[8] It is mainly found in the Yamuna-Hindan interfluve. In Muzaffarnagar it covers about 63 per cent of the cultivated area and is assessed as rausli of first class type.[9] In Meerut it is found in the upland plains of both the central and western tahsils and is mainly responsible for the assessment of Meerut as one of the richest districts in the State which is splendidly cultivated.[10] In Bulandshahr the upland soil is for the most part seota[11] but in the southern parts of the tahsils it tends to become relatively sandy and is

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5. District Gazetteer of Saharanpur, 1903, p.6
6. District Gazetteer of Muzaffarnagar, 1903, p.33.
7. Final Report on the Settlement of Land Revenue in the Bulandshahr, District, North-Western Provinces Part I, 1891, p.44.
8. ibid.
9. District Gazetteer of Meerut, 1922, p.35; and Final Settlement of Report of the Meerut District, 1940, pp.25-27.
10. District Gazetteer of Muzaffarnagar, 1903, p.33
11. District Gazetteer of Bulandshahr,1901, p.16.

therefore of a poorer quality compared with that of Meerut District.

Clayey soils

It is simply dark stiff clay, free from sand and generally found in natural depressions.[12] It is locally known as dakar in all the districts of Upper Doab and corresponds with the matiar of the neighbouring districts.[13] The surface soil is generally grey to dark grey in colour and difficult to work, especially when dry, as it then develops into cloddy structure. But when moistened it becomes puddled up and sticky. It is a moisture retentive soil and is specially suited to rice cultivation. It is often associated with salt effloresceene which appears as white crusts on the surface and renders the soil quite useless for agricultural purposes. With good drainage and adequate irrigation the soil is capable of giving fair harvests of a variety of crops but nevertheless it is particularly used for the cultivation of rice.

In Saharanpur and Muzaffarnagar the dakar soil occurs in scattered patches in the extremely eastern and western tahsils (Fig. 11). On the eastern side it is mainly found near Ganga khadir in parganas Jawalapur and Gurdhanpur. On the western side it forms a long but broken belt stretching from pargana Sultanpur to pargana Bidauli. In Meerut and Bulandshahr on the other hand the dakar soil is mainly confined to the Hindan-East Kali interfluve and runs in broad but broken belt through the

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12. Final Report on the Settlement of Land Revenue in the Bulandshahr District, North-Western Province Part I, 1891, p.44.

13. District Gazetteer of Meerut, 1922 p.37; and District Gazetteer of Saharanpur 1903, p.6.

middle of the districts (Fig.11). On the whole this soil is most extensively found in Meerut district. A few isolated patches of clayey soil also occur in parganas Agota, Siana and Dibai in Bulandshahr district on the east of the East Kali Nadi.

Khadir soils

Khadir soils are associated with the tract of newer alluvial deposits which cover about 10 per cent of the area of Upper Doab. The khadir soil is markedly sandy adjacent to the river banks but away from the banks in the valleys of the rivers it gradually changes from sandy-silt to silt and silty clay. The khadir soil is always exposed to floods and water logging and consequently almost the entire belt of this soil is assessed as agriculturally precarious. The relatively elevated sandy tracts of khadir are somewhat more protected against floods and are generally given to the cultivation of millets, vegetables and melons while the silty-clay soils are used for the cultivation of coarse varieties of rice, peas and grams. The main problem with the khadir soils is the high water table which almost reaches the surface during the season of rains. This not only leads to water logging of the soil but also promotes the formation of reh or crusts of salt efflorescene on surface soil. In certain areas this defect may to some extent be removed by the construction of deep ditches to drain off the water from the subsoil. The effectiveness of this measure however depends upon the presence of sufficient gradient to allow for the rapid flow of the drainage water from the subsoil.

The distribution of khadir soil is shown in Fig.11 and is identical with the distribution of khadir region discussed in Chapter I.

Sandy soil

Sandy soil known as bhur is for the most part a sand of whitish colour. It has many finer grades and varieties. When it contains any appreciable mixture of loam it is fairly productive and often assessed as on par with second grade or inferior seota. But when it drifts or rises into ridges and hillocks it is worthless. It however contains sufficient amount of some useful chemicals and as such when provided with requisite facilities of irrigation it is capable of giving good yields. It is considered and found to be a soil which improves fairly satisfactorily by cultivation and manuring.[14] The soil is generally coarse grained and is not a good retentive of moisture. It is easily friable soil of pale colour and is generally given to cultivation of vegetables and melons and under favourable conditions of rain or irrigation is often used to raise cereal crops such as wheat and millets and also certain pulses. On the whole the sandy soil tracts are classed as agriculturally poor or even precarious. The general distribution of sandy soil is shown in Fig.11 from which it will be seen that it occurs in the districts of Muzaffarnagar Meerut and Bulandshahr in the form of long irregular bends running along

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14. Final Report on the Settlement of Land Revenue in the Bulandshahr District, North-Western Provinces, Part I, 1891, p.44.

the drainage lines of the region. It is most abundant in Meerut whereas least extensive in Muzaffarnagar and almost entirely absent in Saharanpur.

Dark clay soil

It is dark chocolate coloured clayey soil which is extremely productive where the deposit is of sufficient depth.[15] This soil is found exclusively in the submontane belt of Saharanpur district in the region. It is particularly found in the north-western part of the submontane tract on the high terraces between torrent beds and produces very good crops of wheat, rice, gram, millets and sugarcane. This soil also occurs in the central parts of the tract (but it varies in quality) and extends towards the east upto the Ganga khadir. In the eastern portion, however, it is replaced by an alternation of sand and a light soft clay. In the immediate vicinity of the village sites the soil is highly manured and intensively cultivated and is conventionally called by the local name of misan. The misan zones are agriculturally most prosperous portions of the tract and successfully raise many varieties of cereal and non-cereal crops.

Where the deposits are not of any depth the thin layers of the soil which usually rest on a substratum of stones and boulders do not yield well to cultivation and are generally covered with grass and shrub which in many cases provide good pasturage for sheep and goats. Because of the mountanous terrain the danger of rapid soil erosion is very imminent and consequently terracing is highly essential for the conservation of the soil cover and successful cultivation of crops throughout the dark clay tract of the submontane belt.

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15. District Gazetteer of Saharanpur, 1903, p.7.

P A R T II

POPULATION AND AGRICULTURAL RESOURCES

CHAPTER IV

RETROSPECT

1. BEGINNING OF THE CENSUS

Though the first attempt to take a census of the number of inhabitants in the districts of Upper Doab was made as early as 1826 A.D., but the enumerations of a real census standard were carried out for the first time in the year 1848 A.D.[1] The countings which were made in 1826 A.D. were based on the counting of the villages and, partially, of the houses in the districts by the local district officers. The final estimates were, therefore, made on the strength of simple arithmetic calculations. As such the results of these calculations could hardly be taken as reliable.

The enumerations, which were carried through in 1848 A.D., were different from previous estimates inasmuch as they were conducted simultaneously in all the districts under the orders of the government. There seems, therefore, a fairly sufficient justification for considering the returns of the countings of 1848 A.D. as the first official census figures. But this census, too, was founded on rather crude methods which varied from district to district. This, of course, lessened the authenticity of the returns but since the operations were conducted under a centrally organized machinery it was decidedly an improvement upon

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1. In the district gazetteers edited by H.R. Nevill, I.C.S. the first census is placed in the year 1847 but in the report and provincial tables of the Census of India 1891, Vol.XVI (The North-Western Provinces and Oudh) D.C. Ballie I.C.S the provincial superintendent of census operations puts it in the year 1848.

the previous attempts and can not be counted down as unreliable simply because ' the machinery was extremely defective'[2] unless one is prone to be unduly harsh in criticism.

The work on second census commenced on 10th December 1852 and was required to be completed in ten days. It was in many ways an improvement upon the first census. The outstanding feature of this census was a provision of verification. Testing officers were appointed for this purpose 'and it was the duty of the testing officer to visit each village entered in his list and satisfy himself as to the accuracy of the entries.[3] Thus if the 1848 census was the first census the 1852 census (or 1853 from the year of completion as the census operation could not be completed by the appointed period of ten days and extended into the first week of January 1853) was the first reliable census made in these districts.

The system of enumeration which was adopted for the census of 1852-53 was fairly commendable. Principally it comprised two steps. In the first step the houses were to be numbered by the village patwari in a continuous series. This was to be followed by a rough census of the persons in these numbered houses. The rough estimates were made by enquiry of the head of the family and of his neighbours. The work under these two steps was accomplished in the ten days allotted for this preliminary operation. These rough estimates were then checked and tested by the kanungo and other tahsil and district officers. Travellers and visitors were enumerated separately in the night between 31st December and 1st

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2. The District Gazetteer of Saharanpur, 1903, p.95.
3. Census of India 1891, Vol.XVI, Pt.I 1894, p.11.

January. This outline of the system of enumeration is suggestive of a reliably efficient organization so that the returns of 1852-53 may be considered sufficiently reliable to be adopted as base of reference for assessment of the general trend of population during the later half of the nineteenth century.

The justification for considering 1852-53 enumeration as the first reliable census is further strengthened by the comparison of the population figures returned at the preceding census of 1848 and the following censuses of 1865,1872,1881 and 1891. The enormous net increase in population within a short period of five years which intervened between 1848 and 1853 was strikingly larger than the net increase recorded in the subsequent inter-census periods of generally twice as much length. These striking comparisons are shown in table III.

TABLE III

ABSOLUTE INTERCENSAL VARIATION OF POPULATION BY DISTRICTS, 1848 to 1891

District	Variation of population between					Total increase in 39 years 1853-1891
	1848 & 1853	1853 & 1865	1865 & 1872	1872 & 1881	1881 & 1891	
1	2	3	4	5	6	7
Saharanpur	253,972	65,158	17,534	95,527	21,736	199,955
Muzaffarnagar	135,267	9,341	7,895	68,337	14,430	100,003
Meerut	274,336	64,521	76,511	37,023	78,321	256,376
Bulandshahr	79,249	22,089	136,236	-11,845	25,092	171,572

S O U R C E : Census of India 1891, Vol.XVI part I. Abstract No.43,p.156, and Appendix V, p.10.

4. Census of India,op.cit. p.11. Also see De Gruyther's account of the procedure which he adopted in Farrukhabad District.

With the exception of Bulandshahr district the increase in each of the remaining three districts i.e., Saharanpur, Muzaffarnagar and Meerut in the first intercensus period of five years was greater than the total increase during the following thirty-nine years between 1853 and 1891. For instance the absolute increase in the population of Saharanpur and district during the five years between 1848 and 1853 was 253,972 whereas during the thirty-nine years between 1853 and 1891 the increase was 199,955. This in other words means that the total increase in thirty-nine years was less than the five years' increase by 54,017 persons. Table IV showing similar figures for other districts provides a direct comparison between the quantum of variations during the five-year and thirty-nine year period before and after 1853. This extra ordinarily high increase within a short period of five years is still more strikingly exposed when the percentages

TABLE IV

ABSOLUTE VARIATIONS OF POPULATION BY DISTRICTS
1848 to 1853 and 1853 to 1891

District	Absolute variation from		Excess of 5-Year variation over 39-year variation
	1848 to 1853	1853 to 1891	
1	2	3	4
Saharanpur	253,972	199,955	+ 54,017
Muzaffarnagar	135,267	100,003	+ 35,264
Meerut	274,336	256,376	+ 17,960
Bulandshahr	79,249	171,572	- 92,323

S O U R C E : Adapted from table III.

of the successive variations in each of the intercensus period are considered. It will be seen from table V that the percentages in Column No.2 are enormously high compared with percentages in other columns. These contrasts in the quantum of variations are graphically depicted in Fig.12 (a and b).

TABLE V

SUCCESSIVE INTERCENSAL PERCENTAGES OF VARIATION OF POPULATION, 1848 to 1891

District	Successive Percental variations between				
	1848 & 1853	1853 & 1865	1865 & 1872	1872 & 1881	1881 & 1891
1	2	3	4	5	6
Saharanpur	46.40	8.13	2.02	10.80	2.22
Muzaffarnagar	25.16	1.39	1.16	14.20	1.90
Meerut	31.87	5.68	6.37	2.90	5.90
Bulandshahr	11.29	2.80	17.00	- 1.26	2-70

S O U R C E : Calculations based on data from Census of India 1891, Vol.XVI part I, Abstract No.43, p.156.

These comparisons indicate that the 1848 enumeration most probably erred a lot on the side of defect and as such it seems more reasonable to take the 1853 census in stead of the 1848 census as the point of start for the purpose of analyzing the trends of population in Upper Doab.

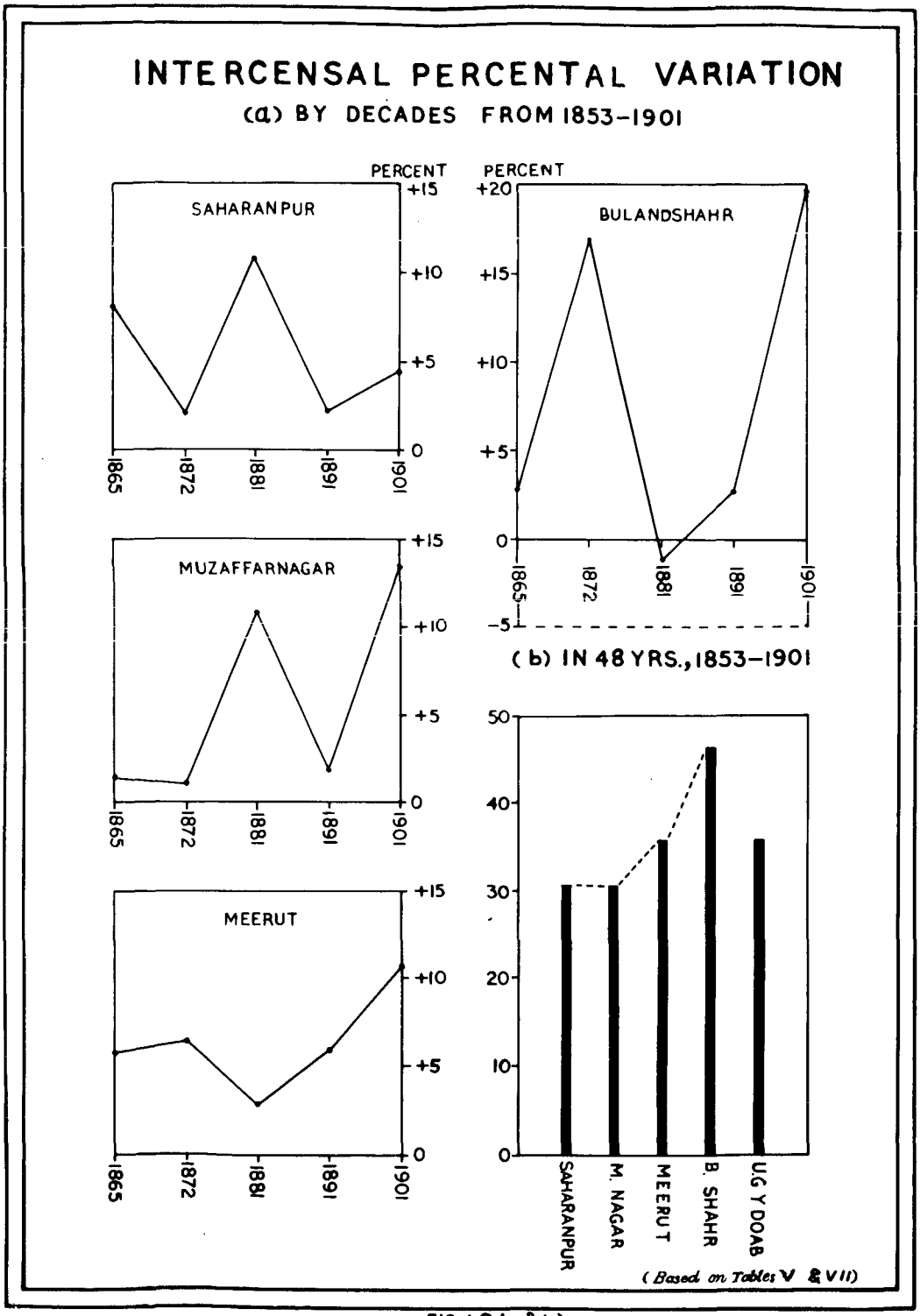

INTERCENSAL PERCENTAL VARIATION
(a) BY DECADES FROM 1853-1901
PERCENT
SAHARANPUR
+15
+10
+5
0
1865
1872
1881
1891
1901
PERCENT
BULANDSHAHR
+20
+15
+10
+5
0
-5
MUZAFFARNAGAR
MEERUT
(b) IN 48 YRS., 1853-1901
50
40
30
20
10
SAHARANPUR
M. NAGAR
MEERUT
B. SHAHR
U.G.Y DOAB
(Based on Tables V & VII)

FIG. 12 (a & b)

2. GROWTH OF POPULATION

The population increased almost steadily in all the four districts during the second half of the 19th century. The only break in the growth occurred in the district Bulandshahr during the intercensus period of 1872 and 1881 when a slight decrease of 11,845 persons against the total population of 936,667 for the year 1872 was recorded in 1881 (Fig.12). This meant a decrease of only 1.26 per cent of the total for 1872. But it was temporary and short-lived as the population more than compensated for this loss in the following decade ending in 1891. According to 1891 census the district recorded a total gain of 25,092 persons on the population for 1881. This meant an overall gain of 13,247 persons over the population of 1872 which was greater than the loss of 11,845 suffered by the district during the period between 1872 and 1881. Thus the steady upward trend of population during the forty-eight years between 1853 and 1901 was maintained even in the district of Bulandshahr. Table VI shows the total population in the four districts for various censuses during the 19th century.

TABLE VI

DISTRICT-WISE VARIATION OF POPULATION OF UPPER DOAB
1853 to 1901

District	Total population in					
	1853	1865	1872	1881	1891	1901
1	2	3	4	5	6	7
Saharanpur	801,325	866,483	884,017	979,544	1,001,280	1,045,230
Muzaffarnagar	672,861	682,212	690,107	758,444	772,874	877,188
Meerut	1,135,072	1,199,593	1,276,104	1,313,137	1,391,458	1,540,175
Bulandshahr	778,342	800,431	936,667	924,822	945,914	1,138,101
Upper Doab	3,387,600	3,548,719	3,786,895	3,975,947	4,115,526	4,600,694

SOURCE : Census of India 1891, Vol.XVI and Census of India, 1901, Vol.XVI-A part II.

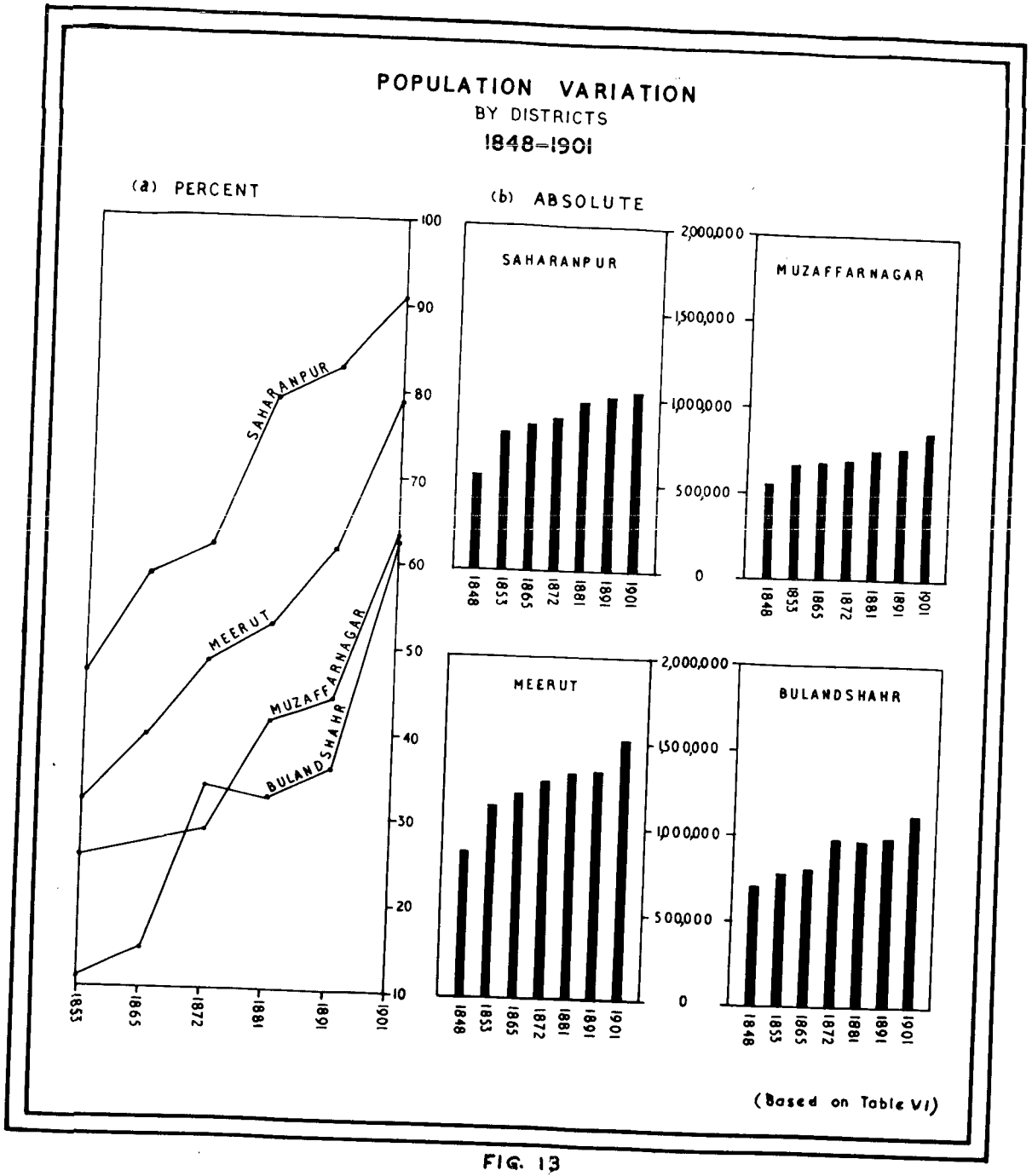

POPULATION VARIATION
BY DISTRICTS
1848–1901
(a) PERCENT
(b) ABSOLUTE
SAHARANPUR
MEERUT
MUZAFFARNAGAR
BULANDSHAHR
100
90
80
70
60
50
40
30
20
10
1853
1865
1872
1881
1891
1901
2,000,000
1,500,000
1,000,000
500,000
0
1848
(Based on Table VI)

FIG. 13

Taking the census year 1853 as base it will be seen that the total increase in the population during the forty-eight years has been great. From a total of 3,387,600 in 1853 the population of Upper Doab increased to 4,600,694 in 1901. This amounts to a percental increase of 35.8 and gives an average decennial rate of growth as about 252,728 persons. The increase was highest in district Bulandshahr where it worked to about 46.2 per cent. In Meerut district the increase was almost equal to the region's average of about 35.8 per cent whereas in districts Muzaffarnagar and Saharanpur it was lowest being about 30.4 per cent a piece. Table VII gives the absolute and percental increase in the population of the four districts during the later half of the 19th century.

TABLE VII

INCREASE IN POPULATION DURING 48 YEARS FROM 1853 to 1901

District	Absolute increase	Percental increase	Average decennial increase
1	2	3	4
Saharanpur	243,905	30.43	50,814
Muzzaffarnagar	204,327	30.36	42,568
Meerut	405,103	35.68	84,396
Bulandshahr	359,759	46.22	74,950
Upper Doab	1,213,094	35.84	252,728

S O U R C E : Calculations based on data from Census of India 1891, Vol.XVI and Census of India 1901 Vol.XVI-A part II.

The growth of population in Upper Doab during forty-eight year period from 1853 to 1901 was highest among the divisions of the State for which census was taken and the data is available. Comparison with the growth indices for the adjoining divisions of Agra and Rohilkhand contained in table VIII shows that the percentage increase in Upper Doab was

TABLE VIII

GROWTH OF POPULATION IN UPPER DOAB AND THE ADJOINING DIVISIONS FROM 1853 To 1901

Region/Division	Total population in		Increase	
	1853	1901	Absolute	Percent
1	2	3	4	5
Upper Doab	3,387,600	4,600,694	1,213,094	35.84
Agra Division	4,639,480	5,249,542	610,062	13.15
Rohilkhand Division	5,044,214	5,479,688	435,474	8.63

S O U R C E : Calculations based on data from Census of India 1891, Vol.XVI, Part I, and Census of India 1901,Vol. XVI-A Part II.

about 2.7 times and more than four times the percentages of increase in these two divisions respectively. A comparison with other divisions of the State for the same period is not possible because the first census in the remaining part of the State was taken as late as 1872.

Comparison with all the divisions of the State is,therefore, possible only for the last quarter of the nineteenth century. Table IX shows the absolute and percental variation of population during twenty-nine years

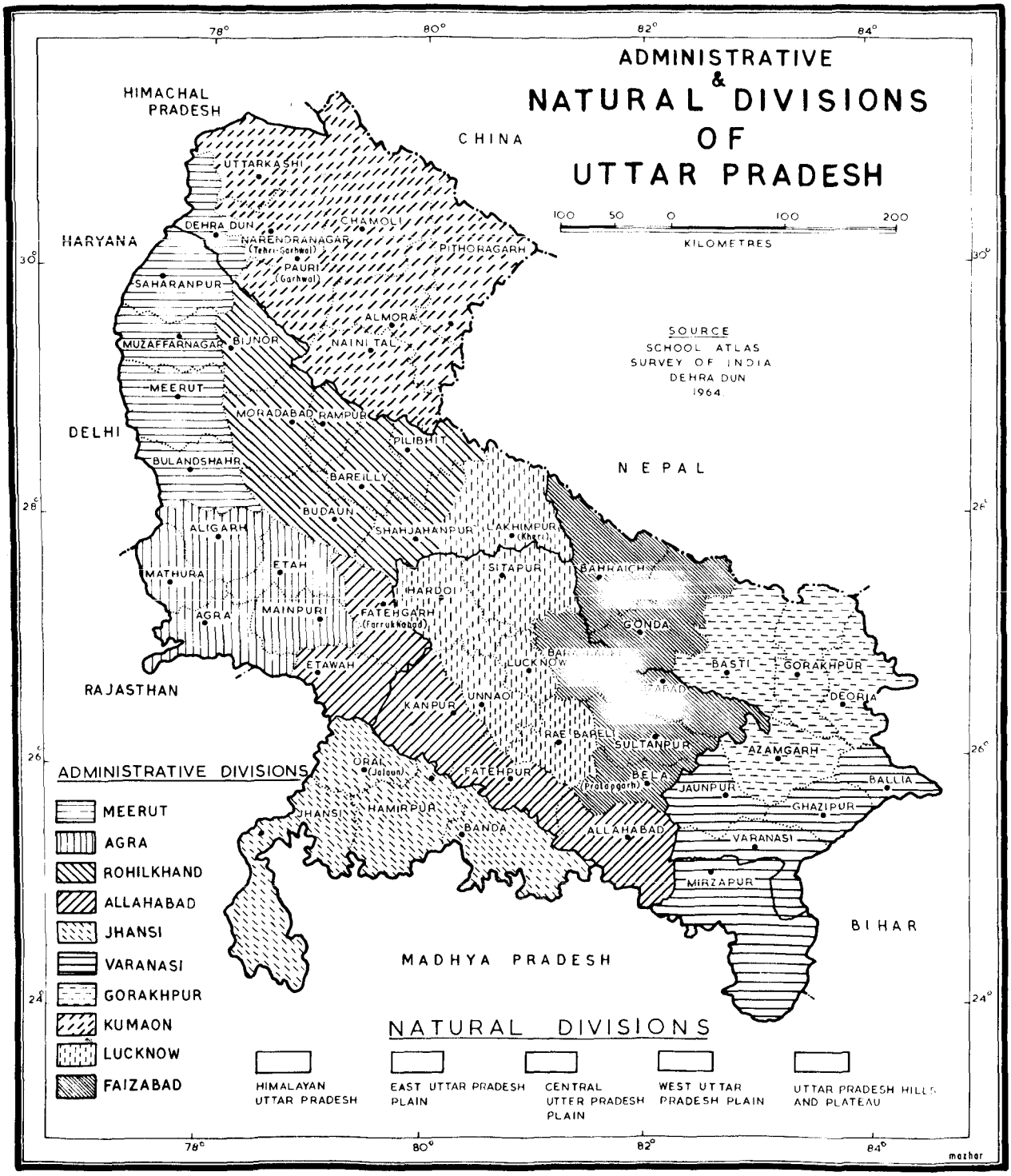
from 1872 to 1901 in Upper Doab and various divisions of Uttar Pradesh (formerly known as North-Western Provinces of Agra and Oudh). It will be seen from the table that in the period 1872 to 1901 the increase in the population of Upper Doab which amounted to about 21.5 per cent was the third highest in the State. Only Gorakhpur and Kumaon divisions registered higher increase amounting to 31.6 and 29.9 per cent respectively whereas the growth percentages in the remaining six divisions (excluding the home

TABLE IX

GROWTH OF POPULATION IN UPPER DOAB AND THE VARIOUS DIVISIONS OF THE STATE FROM 1872 TO 1901

District	Total population in		Increase	
	1872	1901	Absolute	Percent
1	2	3	4	5
Upper Doab	3,786,895	4,600,694	813,799	21.5
Allahabad Division	5,377,928	5,540,702	162,774	3.0
Agra Division	5,040,919	5,249,542	208,623	4.2
Rohilkhand Division	5,250,656	5,479,688	229,032	4.3
Lucknow Division	5,315,583	5,977,086	661,503	12.4
Benaras Divi--sion.	4,395,252	5,069,020	673,768	15.3
Faizabad Divi--sion	5,905,367	6,855,991	950,624	16.1
Meerut Division	4,977,919	5,979,711	1,001,792	20.1
Kumaon Divi--sion	928,823	1,207,030	2,078,207	29.9
Gorakhpur Divi--sion	4,810,016	6,333,012	1,522,996	31.6
U.P.(North Wes--tern provinces and Oudh)	42,002,460	47,691,782	5,689,322	13.7

S O U R C E : Census of India 1901, Vol.XVI-A, N.W. Provinces and Oudh, Part II, Table II.


ADMINISTRATIVE & NATURAL DIVISIONS OF UTTAR PRADESH
78°
80°
82°
84°
30°
28°
26°
24°
HIMACHAL PRADESH
CHINA
HARYANA
DELHI
RAJASTHAN
NEPAL
MADHYA PRADESH
BIHAR
UTTARKASHI
DEHRA DUN
NARENDRANAGAR (Tehri-Garhwal)
CHAMOLI
PITHORAGARH
PAURI (Garhwal)
SAHARANPUR
ALMORA
MUZAFFARNAGAR
BIJNOR
NAINI TAL
MEERUT
MORADABAD
RAMPUR
PILIBHIT
BULANDSHAHR
BAREILLY
BUDAUN
ALIGARH
SHAHJAHANPUR
LAKHIMPUR (Kheri)
MATHURA
ETAH
SITAPUR
BAHRAICH
HARDOI
AGRA
MAINPURI
FATEHGARH (Farrukhabad)
GONDA
BARABANKI
LUCKNOW
BASTI
GORAKHPUR
ETAWAH
KANPUR
UNNAO
DEORIA
RAE BARELI
SULTANPUR
AZAMGARH
ORAI (Jalaun)
FATEHPUR
PRATAPGARH
JAUNPUR
BALLIA
JHANSI
HAMIRPUR
GHAZIPUR
BANDA
ALLAHABAD
VARANASI
MIRZAPUR
100 50 0 100 200
KILOMETRES
SOURCE
SCHOOL ATLAS
SURVEY OF INDIA
DEHRA DUN
1964
ADMINISTRATIVE DIVISIONS
MEERUT
AGRA
ROHILKHAND
ALLAHABAD
JHANSI
VARANASI
GORAKHPUR
KUMAON
LUCKNOW
FAIZABAD
NATURAL DIVISIONS
HIMALAYAN UTTAR PRADESH
EAST UTTAR PRADESH PLAIN
CENTRAL UTTER PRADESH PLAIN
WEST UTTAR PRADESH PLAIN
UTTAR PRADESH HILLS AND PLATEAU
mazhar

division of Meerut) were substantially lesser than that of Upper Doab. Thus the population growth in Upper Doab was considerably higher than the state average being more than one and a-half times of the provincial average of 13.7 per cent.

This relatively high increase in the population of Upper Doab was mainly due to natural growth within the region. Migration played but only an insignificant part in the population variation of the region. Generally speaking the people of the former North-Western Provinces and Oudh were, by nature, little given to migrations. Because of the great abundance of fertile land, fairly sufficient rainfall and the perennial rivers the settlement of the region, from its very early days, has been of a highly sedentary character. It was only in the occasional famine years that the people had perforce to migrate into and from the free and affected districts. But the widespread and large scale measures of canal irrigation undertaken during the sixties of the nineteenth century helped considerably reduce the precariousness of the famine haunted parts of the State. As a result these parts enjoyed better facilities for agriculture and greater security against famines. The regularity of the visitations of famines was effectively broken at least in this sense that they did not result in large scale stampedes of population. The reports in District Gazetteers of the various districts and especially of the Western districts definitely speak of considerable easing in the famine situation and lessening of the pressure to emigrate. The adjoining districts of Punjab also did no longer feel the compelling need to migrate east to the better watered districts of the Doab

as the measures to improve agriculture and conditions of transport system were undertaken there too.

As regards the districts of Upper Doab they became effectively immune from the devastating famines of the old.[5] As such the natural growth of population was not checked or countered by emigration. And since the neighbouring districts did also enjoy effective protection against the visitations of famines the immigration was also not there to swell the population into abnormal dimensions. The migrations during the post-canalization period were mainly due to socio-cultural factors and were indeed of very small magnitude as is amply shown by table X.

The column No.5 of the table shows that the probable increase due purely to immigrations did not exceed beyond five per cent of the population of any district. Saharanpur and Bulandshahr were least affected by migrations as in these districts the immigrants had only a slight edge of 0.5 and 1.9 per cent over the respective emigrants.

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5. With regard to the famine situation during the post-canalization period of the 19th century the following extracts from the District Gazetteers are of relevant interest:
" The famine of ~~1868~~ did not press hardly on this district owing in great part to the extension of irrigation during the last 10 years. The terrible famine of 1877 found this district perfectly secure." (D.G. of Bulandshahr, 1901, p.50)

" The scarcity of 1899 that worked much havoc in western and central part of India was wholly unfelt in this district."(D.G. of Bulandshahr 1901, p.52)

" The country has been rendered practically secure against all ordinary calamities". (D.G. of Bulandshahr 1901, p.45).

" The district with its ample means of irrigation is practically secured against famines". (D.G. of Bulandshahr 1901, p.57).

" The famine of 1868 did not effect this district to any great extent, and the same may be said of all subsequent periods of scarcity". (D.G. of Meerut, 1901, p.58)

TABLE X

PERCENTAGE OF IMMIGRANTS AND EMIGRANTS IN 1891

District	Born and resident	Immigrants	Emigrants	Excess of immigrants over Emigrants
1	2	3	4	5
Saharanpur	92.59	7.4317	6.904	0.5277
Muzaffarnagar	85.27	14.7337	9.757	4.9767
Meerut	86.84	13.1386	8.066	5.0726
Bulandshahr	86.17	13.8281	11.95	1.8781

S O U R C E : Census of India, 1891, Vol.XVI, Abstracts 87 and 89, pp.277 and 281. The last column of the table is an addition by the author.

5. contd.

" Before the opening of the canals Muzaffarnagar must have suffered much from the famines, which have periodically visited the Doab." (D.G. of Muzaffarnagar, 1903, p.57).

" Since 1869 the district has been practically free from the famines". (D.G. Muzaffarnagar, 1903, p.57).

" In early days the district suffered repeatedly from famine, in common with the rest of the Upper Doab". (D.G. of Saharanpur 1903, p.69). " The general famine of 1877-78 affected Saharanpur only to a small extent". (D.G. Saharanpur, 1903, p.74).

" Saharanpur suffered to some extent from the cycle of bad seasons which began in 1894, although the famine here was insignificant as compared with the conditions of affairs that prevailed in other parts of the provinces". (D.G. of Saharanpur, 1903, p.74).

This, however, does not convey a fully crystalized idea of the situation as the emigrants could not be counted in the population of the district whereas the enumerated population is that which is constituted by the local born and resident and the immigrants. A better assessment of the role of migrations may, however, be had if the total increase during the decade 1881-1891 is compared with the natural increase during the period. Table XI shows the total and natural increase in each of the districts. The total increase is obtained by taking the difference of the populations for 1881 and 1891. Natural increase is determined by finding the excess of births over deaths during the decade.

TABLE XI

TOTAL AND NATURAL INCREASE DURING THE DECADE
1881 - 1891

District	Total increase	Natural increase	Excess of		Remarks
			Natural over total increase	Total over natural increase	
1	2	3	4	5	6
Saharanpur	21,736	27,463	5727	...	An emigrant district
Muzaffarnagar	14,430	11,468	...	2962	An immigrant district
Meerut	78,321	64,762	...	13559	An immigrant district
Bulandshahr	26,092	32,374	7282	...	An emigrant district
Total	139,579	136,067	13,008	16,521	

Increase due to Immigration into the Upper Doab 3,512

SOURCE: Based on the Appendix XVIII to the Census of India 1891, Vol. XVI, page 30.

From the table it will be noted that in the districts of Saharanpur and Bulandshahr the increase due to natural growth was in excess of the total increase returned in the census. This is indicative of emigration and though these districts were classified immigrant districts[6] on economic considerations they were infact emigrant districts on an overall basis. Surely these emigrations which caused a reduction of 5727 and 7282 persons in the two districts respectively were not symtomatic of precariousness or low prosperity, rather they were mainly the outcome of the socio-cultural habits of the people. Baillie has pointed out that "the social cause of migration is by far the most important in its numerical result. It is the custom for all high castes and for most low castes to take their wives from a clan or cast subdivision outside that to which they themselves belonged."[7] From the number of immigrants to the district of Muzaffarnagar and Meerut it seems very likely that the majority of the Saharanpur and Bulandshahr emigrants might have gone to their respective contiguous districts. Since the conditions of agricultural security and prosperity were almost similar throughout the Upper Doab the cultural motive of movements seems to be the most likely and plausible explanation of the position. This is to some extent confirmed by the details of the number of migrants with respect to places from and to which they took place. Table XII which incorporates these details clearly indicates the the preponderance of migrations to and from the neighbouring districts.

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6. Census of India 1891, Vol. XVI, p.280

7. Census of India 1891, Vol.XVI, p.276.

It is, however, neither necessary nor certain that the neighbouring districts involved in these movements were the Upper Doab districts alone. However, the probability seems greater in favour of the Upper Doab districts specially when the numbers of probable immigrants and emigrants in these districts did not differ much and tended to neutralise the effect of the movement of the population. As a result of this migration had but merely an insignificant share of only 3,512 persons in the total increase of 139,579 persons in the population of Upper Doab. This accounts for only 2.5 per cent of the total increase in the region. It may, therefore, be appreciated that the main cause of great increase in Upper Doab population was the rapid rate of natural multiplication augmented by increased prosperity and security during the post-canalization period of the 19th century.

TABLE XII

PERCENTAGE OF IMMIGRANTS AND EMIGRANTS TO AND FROM CONTIGUOUS DISTRICTS, 1891

District	Total immigrants	Immigrants from neigh--bouring districts	Total Emigrants	Emigrants to neighbouring districts.
1	2	3	4	5
Saharanpur	7.4	4.3	6.9	6.2
Muzaffarnagar	14.7	12.7	9.6	9.4
Meerut	13.1	9.4	8.1	6.8
Bulandshahr	13.8	11.9	12.0	10.8

S O U R C E : Census of India 1891, Vol.XVI, Abstract 87 and 89 pp.277 and 281

That the principal cause of migrations was the matrimonial custom is further confirmed by the striking preponderance of female upon male migrants. Table XIII shows that with the exception of Saharanpur district the ratio between the male and female immigrants was roughly 1:2 in the remaining three districts which was practically also the average ratio for

TABLE XIII

SEX-WISE DISTRIBUTION OF IMMIGRANTS BY DISTRICTS, 1891

District	Born outside the district			
	Males		Females	
	Total	Percent	Total	Percent
1	2	3	4	5
Saharanpur	34515	46.3	39885	53.6
Muzaffarnagar	38795	34.1	75077	65.9
Meerut	68908	37.7	113900	62.3
Bulandshahr	40819	31.1	90471	68.9

SOURCE : Census of India 1891, Vol.XVI Appendix XXV, pp.44-47. The percentage columns are added by the author.

Upper Doab taken as a whole.[8]

The comparison of the male and female migrants and of the emigrants and immigrants (tables XI,XII,XIII) in the four districts of the Upper Doab clearly shows that the migrations were neither important in their numerical effects nor they were indicative of serious precariousness of the districts.

The gross increase in the population of Upper Doab during about fifty years (1853 to 1901) of the 19th century amounted to 1,213,094 persons over the 1853 total of 3,387,600 persons or about 35.8 per cent of the population in 1853. This considerable increase, though not uniformly distributed amongst the various districts and the various years of enumera-tion, as indicated by table XIV, set the pace and stage for the dynamism of the numbers during the twentieth century. Fig.12(a) shows the regular

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8. The dominance of females amongst the migrants was not confined to Upper Doab districts only. It was the common feature of the migrant population of the whole of the State. According to the 1891 census the sex-wise break up of the migrant population in various divisions of U.P. was as under:-

Division	Total	Males	Females	Percentage of males	Percentage of females
1	2	3	4	5	6
Meerut	711,176	281,843	429,333	39.6	60.4
Agra	782,453	271,002	511,451	34.7	65.3
Rohilkhand	604,130	220,173	383,957	36.5	63.5
Allahabad	640,560	257,523	383,037	40.3	59.7
Benaras	439,298	129,107	310,191	29.4	70.6
Gorakhpur	428,759	166,973	261,786	39.0	61.0
Kumaon	149,263	88,398	60,865	59,3	40.7
Lucknow	667,732	290,475	377,257	43.5	56.5
Faizabad	711,113	274,915	436,198	38.7	61.3
Total	5,134,484	1,980,399	3,153,975	38.6	61.4

The table clearly indicates that the normal ratio between male and female immigrants in the State was again roughly 1:2 and as such there was nothing abnormal about the preponderance of female migrants over the male migrants in Upper Doab and its four districts.

ups and downs through which the population curve ran during the later half of the 19th century which at its close registered considerable net gains as indicated by Fig. 12(b). It is interesting to note that the variation curves in the two northern districts are of one pattern and the curves of variation in the two southern districts are of an other pattern. However when the 20th century began Upper Doab population had already acquired a rate of increase of about twelve per cent per decade or an average of about 1.2 per cent per annum on the population of the previous census year.

TABLE XIV

INTERCENSAL AND AGGREGATE PERCENTAL INCREASE OF THE POPULATION OF UPPER DOAB BY DISTRICTS FROM 1853 to 1901

District	Percental increase of the population in					
	1865 of 1853	1872 of 1965	1881 of 1872	1891 of 1881	1901 of 1891	1901 of 1853
1	2	3	4	5	6	7
Saharanpur	8.1	2.0	10.8	2.2	4.4	30.4
Muzaffarnagar	1.4	1.1	9.9	1.9	13.5	30.3
Meerut	5.7	6.4	2.9	5.9	10.6	35.7
Bulandshahr	2.8	17.0	- 1.2	2.7	19.8	46.2
Upper Doab	4.7	6.7	5.0	3.5	11.8	35.8

SOURCE : Calculations based on data from Census of India 1891 and 1901 Vol.XVI & XVI-A respectively.

CHAPTER V

GROWTH OF POPULATION 1901-51

SECTION I GENERAL TREND OF VARIATION

During the period 1901-51, as a whole, the population of Upper Doab recorded an absolute increase of 1,755,811 person over the 1901 total. In 1901 the four districts of Upper Doab contained 4,600,694 persons and in 1951 their population was enumerated as 6,356,505 persons. This meant an increase of about 38.16 per cent. Thus the magnitude of growth in the first half of the twentieth century was definitely greater than what it was in the second half of the nineteenth century because, as has been noted earlier, the increase during the period 1853-1901 was about 35.8 per cent.

The increase in the population of Upper Doab was greater compared with the increase in the State as a whole. In 1901 the region accounted for about 9.64 per cent of the State total but in 1951 the percentage rose to 10.05. Compared with the 38.16 per cent increase in Upper Doab the increase in the State during 1901 to 1951 was 32.55 per cent. This relatively high increase was despite of a loss of 128 square miles in the area of Upper Doab and a gain of 6,330 square miles in the area of the State. The absolute and percental variations of the population and area of Uttar Pradesh and Upper Doab during the fifty-year period are given in table XV.

The increase of 38.16 per cent in the population of Upper Doab was, however, not the result of a steady and continuous growth. Between 1901 and 1951 there were two decades of decline in the population. The region suffered

TABLE XV

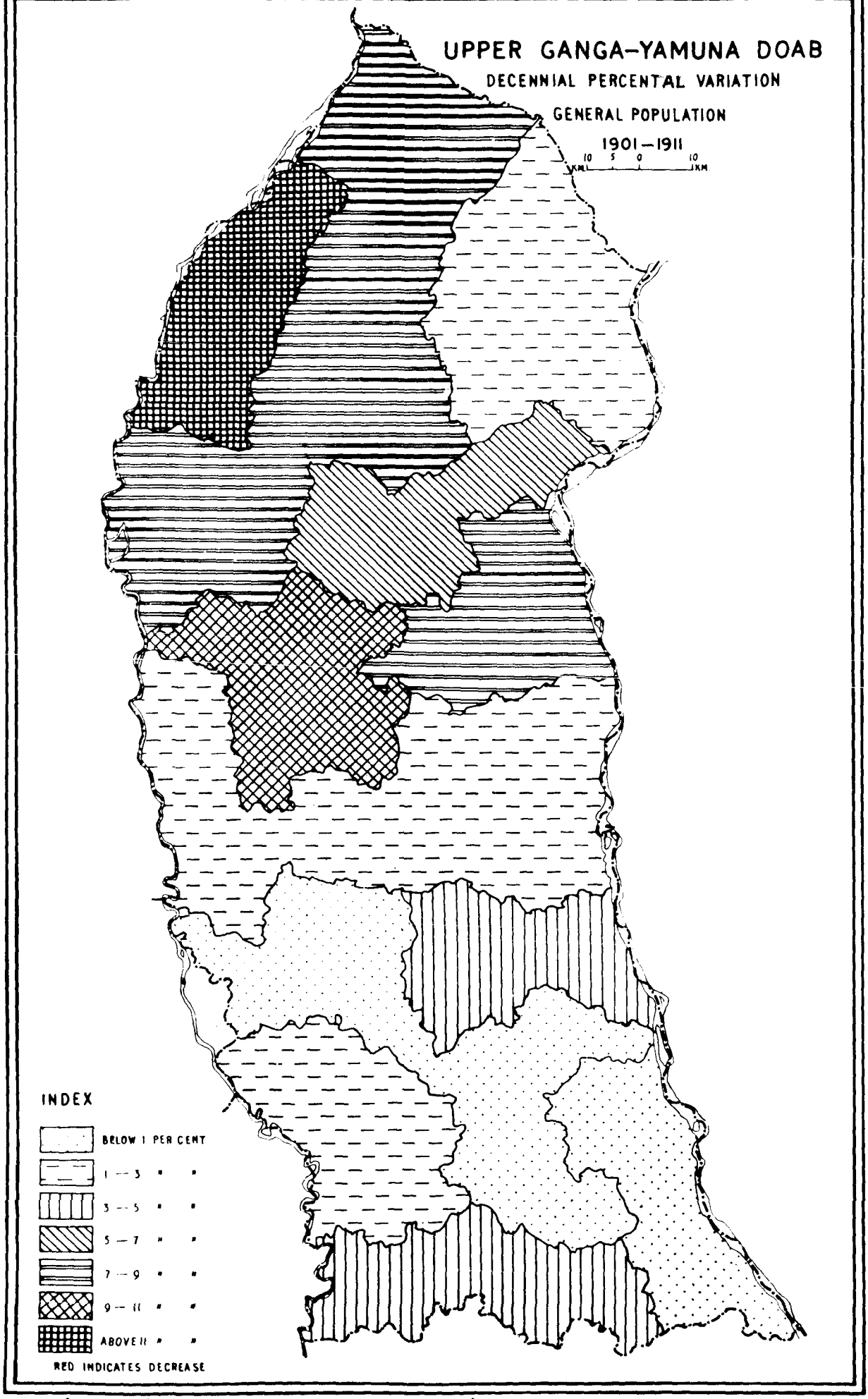
ABSOLUTE AND PERCENTAL VARIATION OF THE POPULATION AND AREA OF U.P. AND UPPER DOAB

Region	Population				Area (in square miles)			
	1901	1951	Variation Absolute	Variation Per cent	1901	1951	Variation - Loss + Gain Absolute	Variation - Loss + Gain Per cent
1	2	3	4	5	6	7	8	9
U.P.	47,691,782	63,215,742	15,523,960	32.55	107,164	113,494	+6,330	+ 5.9
Upper Doab	4,600,694	6,356,505	1,755,811	38.16	8,149	8,021	- 128	- 1.6

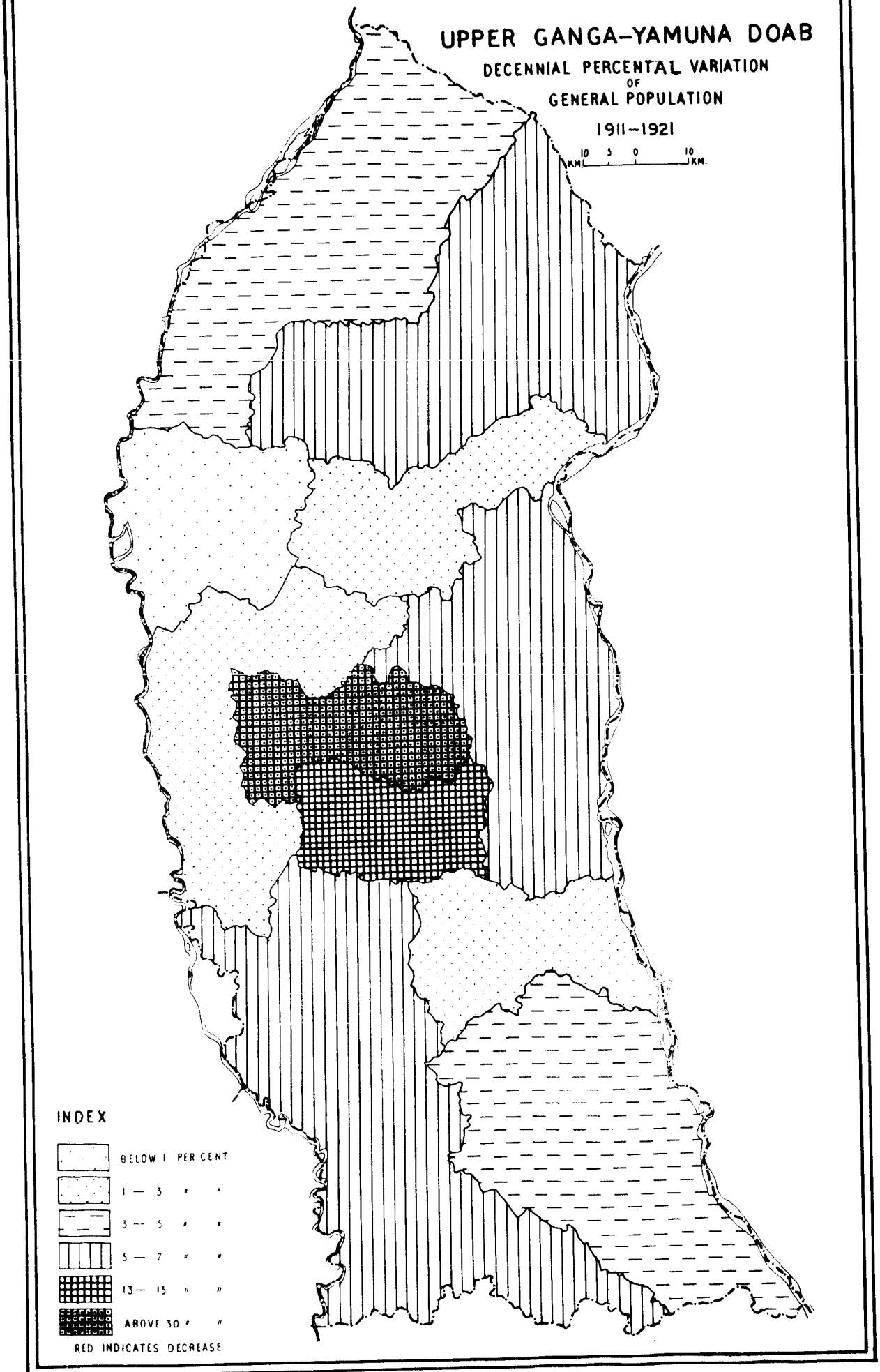
S O U R C E : Calculations based on data from Census of India, 1901, and 1951 N.W. Provinces and Oudh and U.P., Imperial and Provincial Tables.

substantial loss of population during the decades 1901-11 and 1911-21. But thenceforth the population began to increase rather rapidly so that by 1951 the loss of the earlier decades was more than compensated and the population recorded an increase of about 38 per cent over the 1901 total. The regional distribution of percental variation of population from decade to decade for the period 1901-1951 is shown in Figs. 13,14,15,16,17 and 18. From these maps it will be seen that both the decrease of the first two decades and increase of the subsequent ones were rather steady and almost universal in all the districts of Upper Doab.

The population touched its lowest in the year 1921. In the later twenties the downward trend of population was effectively checked and reversed so that



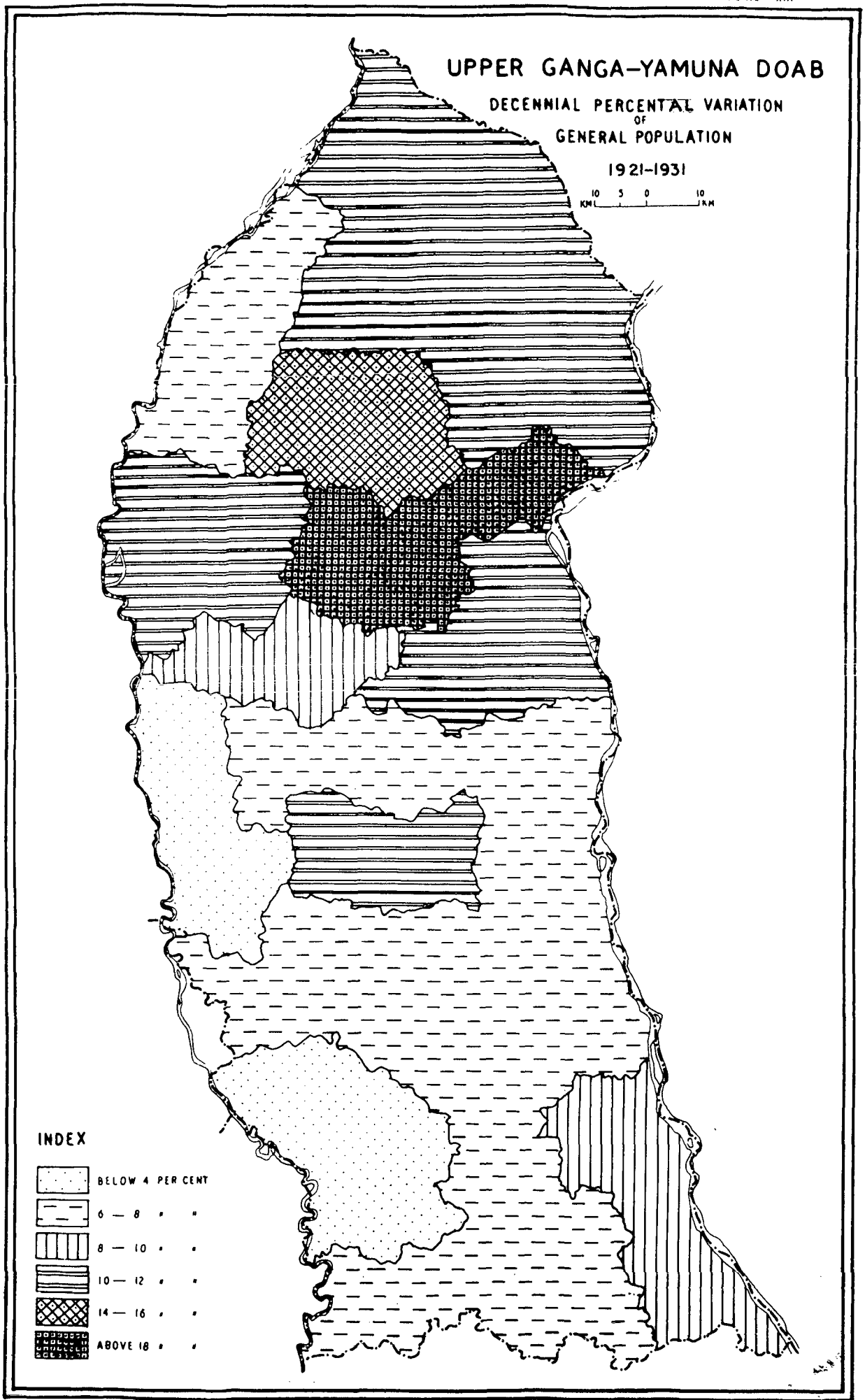
Source of Data : Census of India 1911, vol. XV, pt. II and Distt. Gaz. 1903 FIG. 14



Source of Data: Census of India 1911, vol. XV, pt. II and 1921 vol. XVI pt. II

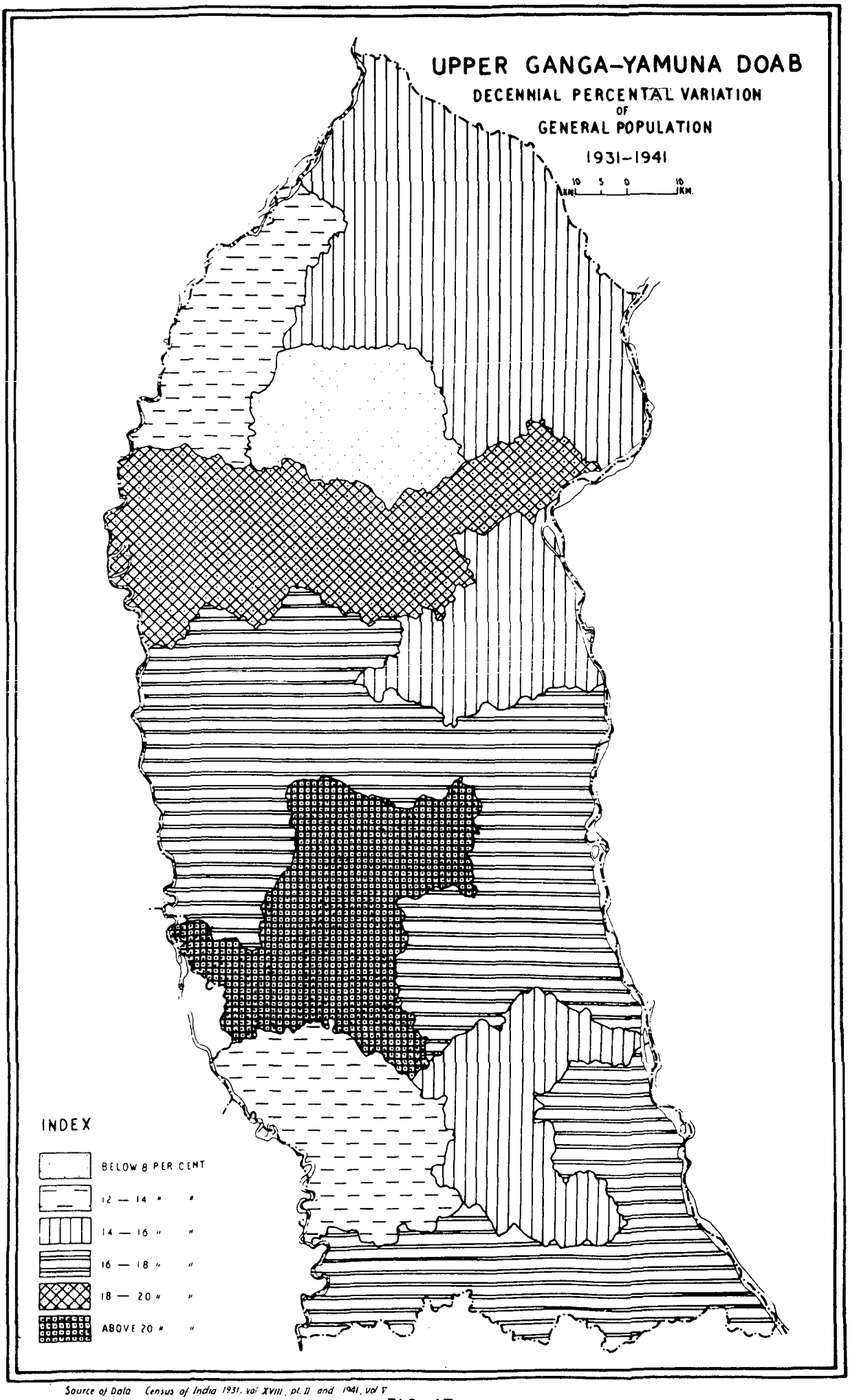
FIG. 15

PLATE XIII



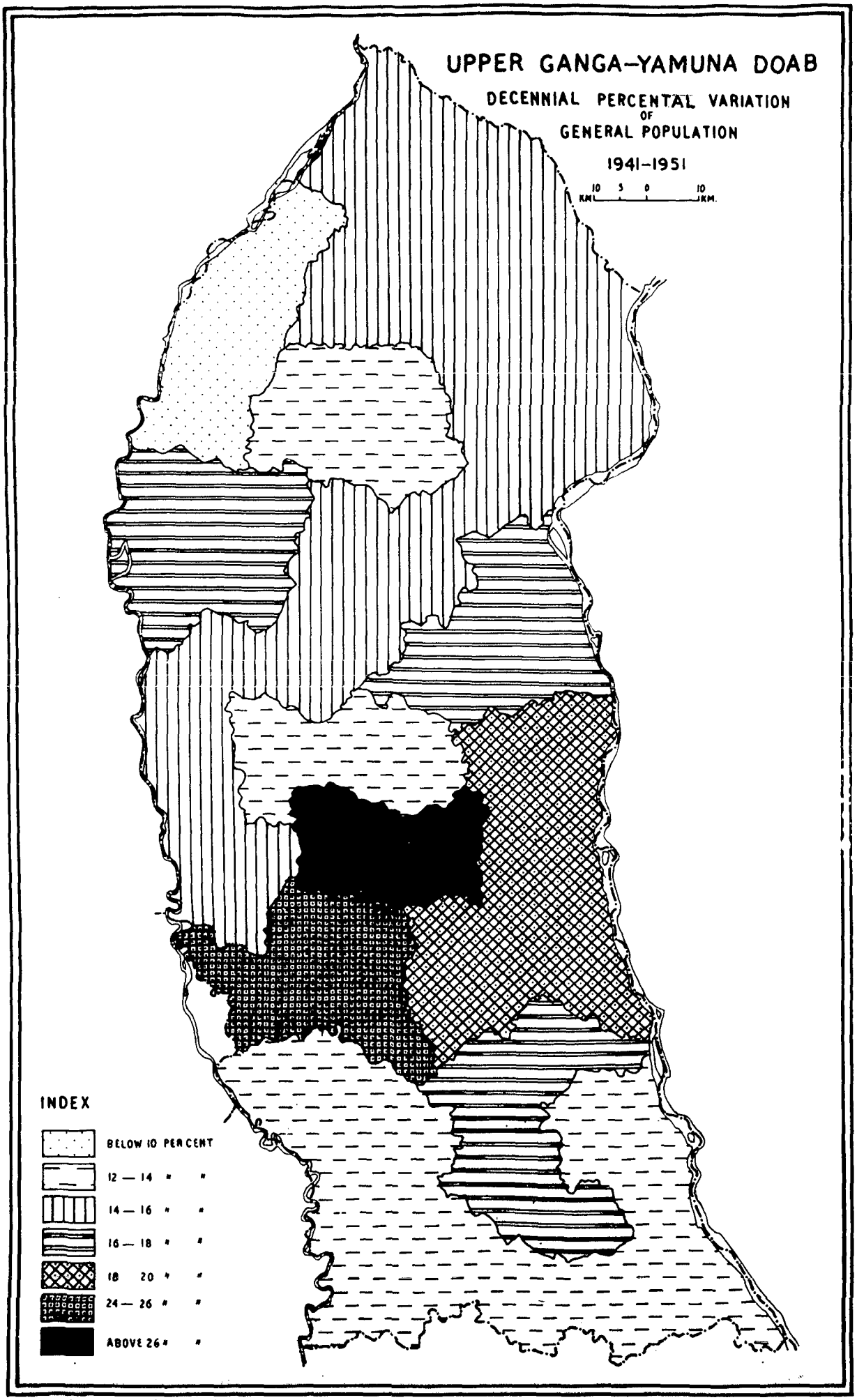
Source of Data: Census of India 1921, vol. XVI pt. II, and 1931, vol. XVIII pt. II

FIG. 16



Source of Data Census of India 1931, Vol XVIII, pt. II and 1941, Vol V

FIG. 17



Source of Data : Census of India, 1941, vol. v and Distt. Census Handbooks 1951

FIG. 18

the losses of the two earlier decades were more than made up by the beginning of the fourth decade. In 1931 the population of Upper Doab had a net increase of 95,404 persons over that of 1901. The upward trend which the variation curve acquired after 1921 depression was maintained with increasing intensity during the subsequent decades. The relevant statistical details showing this trend of variation by districts are set out in table XVI.

A brief comparison with the divisions of Uttar Pradesh may be quite suggestive. Basically the general trend of variation in Upper Doab as noted above did not differ much from that of the State and its major divisions. The earlier decline was universal in the whole of the State. There were only a few eastern districts such as Gorakhpur, Benaras, and Gonda which were not affected by the general decline of 1911 and 1921. But it is noteworthy that the subsequent gains in population in 1931, 1941 and 1951 were not as high in these eastern districts as they were in many of the districts which had suffered reduction in the first two decades. Moreover the increase in population of these eastern districts during the lean decades (the decades ending in 1911 and 1921) was very small. Table XVII shows the increase and decline in the population of various divisions of the State. It will be seen from the table that the decline of the earlier decades was widespread in the whole of the State and did never fall below 3.9 per cent. Gorakhpur was the only division which escaped this decline and recorded an increase of 6.1 per cent or an absolute gain of 387,703 persons even during 1901-21. It is also evident from the table that in respect of percental gain Upper Doab stood very high among the divisions of the State but occupied middle position in respect of percental loss which was only 1.5 per cent in excess of the provincial average of 4.0 per cent.

TABLE XVI
ABSOLUTE POPULATION AND VARIATION BY DISTRICTS
1901-1951
(with 1901 as base)

- Decrease
- Increase

Absolute population and variation									
1911		1921		1931		1941		1951	
al	Variation 1901-11	Total	Variation 1901-21	Total	Variation 1901-31	Total	Variation 1901-41	Total	Variation 1901-51
	4	5	6	7	8	9	10	11	12
86,359	- 58,871	937,471	-107,759	1,043,920	- 1,310	1,180,466	-135,236	1,353,636	-308,406
08,360	- 68,828	794,265	- 82,923	894,662	- 17,474	1,056,759	-179,571	1,221,768	-344,580
19,364	- 20,811	1,499,074	- 41,101	1,601,918	- 61,743	1,896,582	-356,407	2,281,217	-741,042
23,792	- 14,309	1,066,519	- 71,582	1,136,885	- 12,16	1,317,223	-179,122	1,499,884	-361,783
37,875	-162,819	4,297,329	-303,365	4,677,385	- 76,691	5,451,030	-849,513	6,356,505	-1,755,811

rovincial Tables, Census of India, U.P., for various years.

The general trend of growth of population may also be assessed from the successive decennial variations expressed as percentages of mean population of the decade concerned. Table XVIII which incorporates mean successive decennial variations in the districts of Upper Doab reveals that the recovery from the decline probably started earlier than the year of the lowest population namely 1921. The mean rate of decrease in the region as a whole and in three of its districts during the decade 1911-20 was lower than the mean rate of decline during the preceding decade (i.e.1901-1910)

TABLE XVII

ABSOLUTE AND PERCENT GAIN DURING FIFTY YEARS 1901-51, AND LOSS DURING TWENTY YEARS 1901-21 IN THE DIVISIONS OF UTTAR PRADESH

Division	GAIN 1901-1951		LOSS 1901-1921	
	Absolute	Percent	Absolute	Percent
1	2	3	4	5
Upper Doab	1,755,811	38.2	304,365	5.5
Meerut*	1,958,047	41.1	251,381	5.2
Agra*	1,354,314	28.6	535,680	11.1
Rohilkhand	1,185,858	19.6	530,845	8.8
Jhansi	636,292	28.2	138,113	6.1
Banaras	1,780,964	35.1	261,578	5.1
Gorakhpur	2,498,229	39.4		0.0
Komaum	684,067	46.3	18,796	3.9
Lucknow	1,175,749	19.6	409,930	6.8
Allahabad	1,810,061	35.1	371,078	7.2
Faizabad	1,506,851	21.9	256,591	3.7
The Whole State	15,523,960	32.5	1,955,445	4.0

* Upto 1931 Meerut Division comprised six districts of Dehra Dun, Sahranpur, Muzaffarnagar, Meerut, Bulandshahr and Aligarh, but from 1931 Aligarh distri was transferred to Agra Division.

S O U R C E: Census of India, U.P., Imperial and Provincial Tables for various years.

Bulandshahr district was the only exception. Decline in this district was progressive and attained the maximum rate in the second decade i.e, 1911-20. It will, however, be noted that indications given by successive decennial rates have their own fallacies and are sometimes likely to be rather misleading. The main defect of such rates is that they are calculated on different denominators and, therefore, are not unqualifiedly suitable for comparative analysis. Besides, a lower absolute decrease when calculated on the base of a lower absolute number would emerge as a high percentage whereas a higher absolute decrease might get a low percentage value when calculated on the base of a higher absolute number.

TABLE XVIII

SUCCESSIVE DECENNIAL VARIATION BY DISTRICTS,
1901 to 1950

District	1) Decennial population 2) Decennial rate	1901-10	1911-20	1921-30	1931-40	1941-50
1	2	3	4	5	6	7
Saharanpur	1. Mean Pop.	1,015,794	961,915	990695	111,219	1,267,051
	2. Mean Rate	-5.8	-5.1	10.7	12.2	13.7
Muzaffarnagar	1. Mean Pop.	842,774	801,312	844,464	975,710	1,139,264
	2. Mean Rate	-8.1	-1.8	11.9	16.6	14.5
Meerut	1. Mean Pop.	1,529,769	1,509,219	1,550,496	1,749,250	2,088,899
	2. Mean Rate	1.4	-1.4	6.7	16.8	18.4
Bulandshahr	1. Mean Pop	1,130	1,095,156	1,101,702	1,227,054	1,408,553
	2. Mean Rate	-1.3	-5.2	6.4	14.5	13.0
Upper Doab	1. Mean Pop	4,519,284	4,367,602	4,487,357	5,064,207	5,903,767
	2. Mean Rate	-3.6	-3.2	8.5	14.3	15.3

S O U R C E : Calculations based on data from Imperial and Provincial Tables Census of India, U.P. for various years.

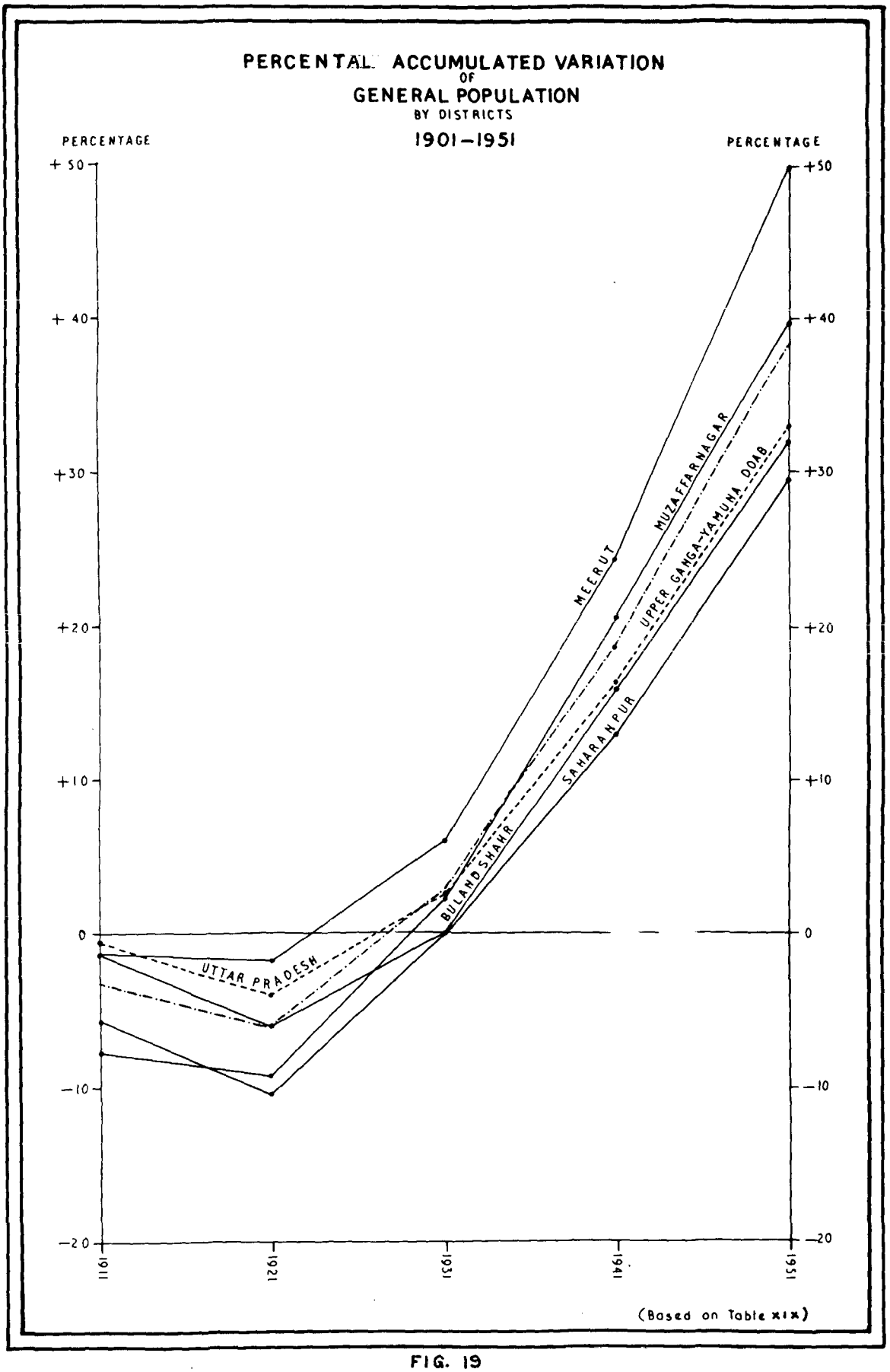

PERCENTAL ACCUMULATED VARIATION
OF
GENERAL POPULATION
BY DISTRICTS
1901–1951
PERCENTAGE
PERCENTAGE
+50
+40
+30
+20
+10
0
−10
−20
1911
1921
1931
1941
1951
MEERUT
MUZAFFARNAGAR
UPPER GANGA-YAMUNA DOAB
BULANDSHAHR
SAHARANPUR
UTTAR PRADESH
(Based on Table xix)

FIG. 19

On the contrary a continuous rate of variation expressed as percentage of the population of a particular census may be more suggestive of the actual dynamism of the numbers and would be more suitable for purposes of comparisons. Table XIX shows percentages of accumulated variation in each decade with 1901 population as base.

TABLE XIX

INTERCENSAL ACCUMULATED VARIATION OF POPULATION OF UPPER DOAB AND ITS DISTRICTS, 1901 to 1951

District / Region	Percentage of increase( ) or decrease(-) to the population in 1901				
	1911	1921	1931	1941	1951
66 1	2	3	4	5	6
Saharanpur	-5.6	-10.3	-0.12	13.0	29.4
Muzaffarnagar	-7.8	- 9.3	2. 2	20.6	39.5
Meerut	-1.3	- 1.7	5.1	24.4	49.6
Bulandshahr	-1.3	- 6.2	-0.01	15.8	31.9
Upper Doab	-3.54	- 6.23	2.08	18.94	38.16
Uttar Pradesh	-0.97	- 4.02	2.36	16.26	32.55

S O U R C E : Calculations based on data from Imperial and Provincial Tables, Census of India, U.P., for various years.

That the population numbers continued to decline upto 1921 in Upper Doab as a whole and in the districts apiece is indicated by Fig.19. A close study of the variation curves in Fig.19 reveals that the reversal of variation from decrease to increase did not begin earlier than the middle of the third decade. Fig.20 on the other hand gives a slightly different impression. Three

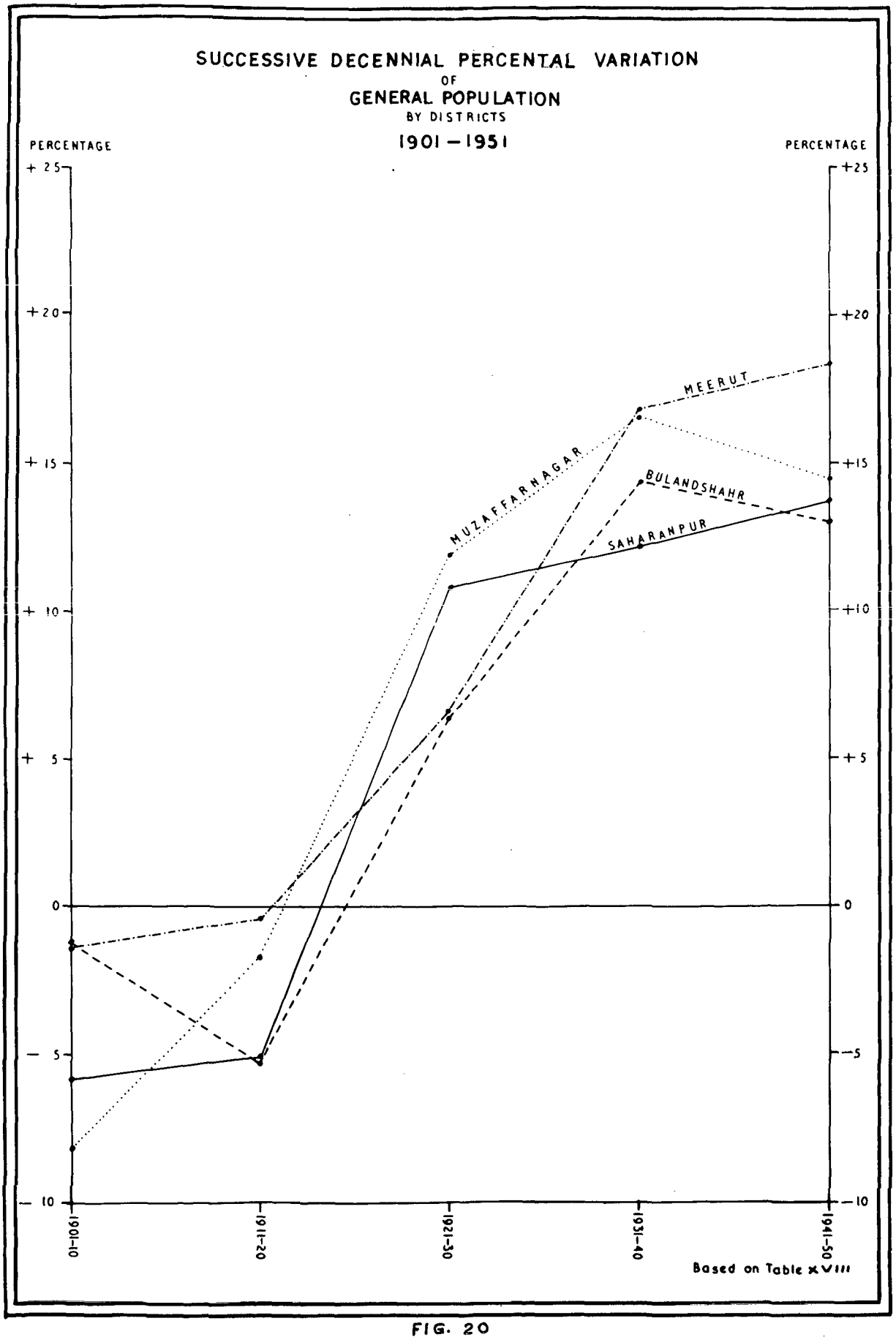

SUCCESSIVE DECENNIAL PERCENTAL VARIATION
OF
GENERAL POPULATION
BY DISTRICTS
1901 – 1951
PERCENTAGE
PERCENTAGE
+ 25
+ 20
+ 15
+ 10
+ 5
0
– 5
– 10
MEERUT
MUZAFFARNAGAR
BULANDSHAHR
SAHARANPUR
1901–10
1911–20
1921–30
1931–40
1941–50
Based on Table XVIII

FIG. 20

out of the four districts appear to have acquired an upward trend of variation in the second decade. Bulandshahr was the only district in which the population continued to follow a downward curve during that decade. Then during the fifth decade the districts Bulandshahr and Muzaffarnagar seem to have again veered to a downward trend whereas the districts Saharanpur and Meerut continued to follow a gradually rising curve. In contradistinction to this the curves of population as shown in Fig.19 seem to have maintained a steady rise at a precipitous angle. From the co-ordination of trends indicated by these two Figures it may be concluded that the population numbers declined upto 1921 and thenceforth kept increasing. But both the decrease of the earlier decades and the increase of the later decades were constantly decelerated successively from decade to decade. This latter phenomenon of deceleration not only kept the population away from early explosion but also made the numbers to trace a sigmoid (Fig.20) within fifty years of the twentieth century.

Thus on the whole the population in Upper Doab seems to have passed through three phases of variation during the first half of the present century. The first phase of steady and progressive decline was experienced during the first two decades,[1] the second phase of transition from decrease to increase occurred during the third decade, and the third phase of acceleratory increase began at the beginning of the fourth decade. Through this process of sigmoidal variation the population of Upper Doab increased by the big margin of 1,773,662 over 1901 total in a period of fifty years. This on an average works to about a net increase of 100 persons per day or an addition of about four person every hour.

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1. The main cause of the abnormal decline, as pointed out by census superintendent, was the epidemic attack of plague, malaria and influenza. Census reports, gazetteers and medical reports indicate that these epidemics could not be effectively checked before the middle of the third decade. This corroborates the inference that the reversal in the trend of population variation took place in the later half of the third decade so that 1931 population registered a slight gain over that of 1901.

CHAPTER V

SECTION II
FIRST PHASE OF VARIATION

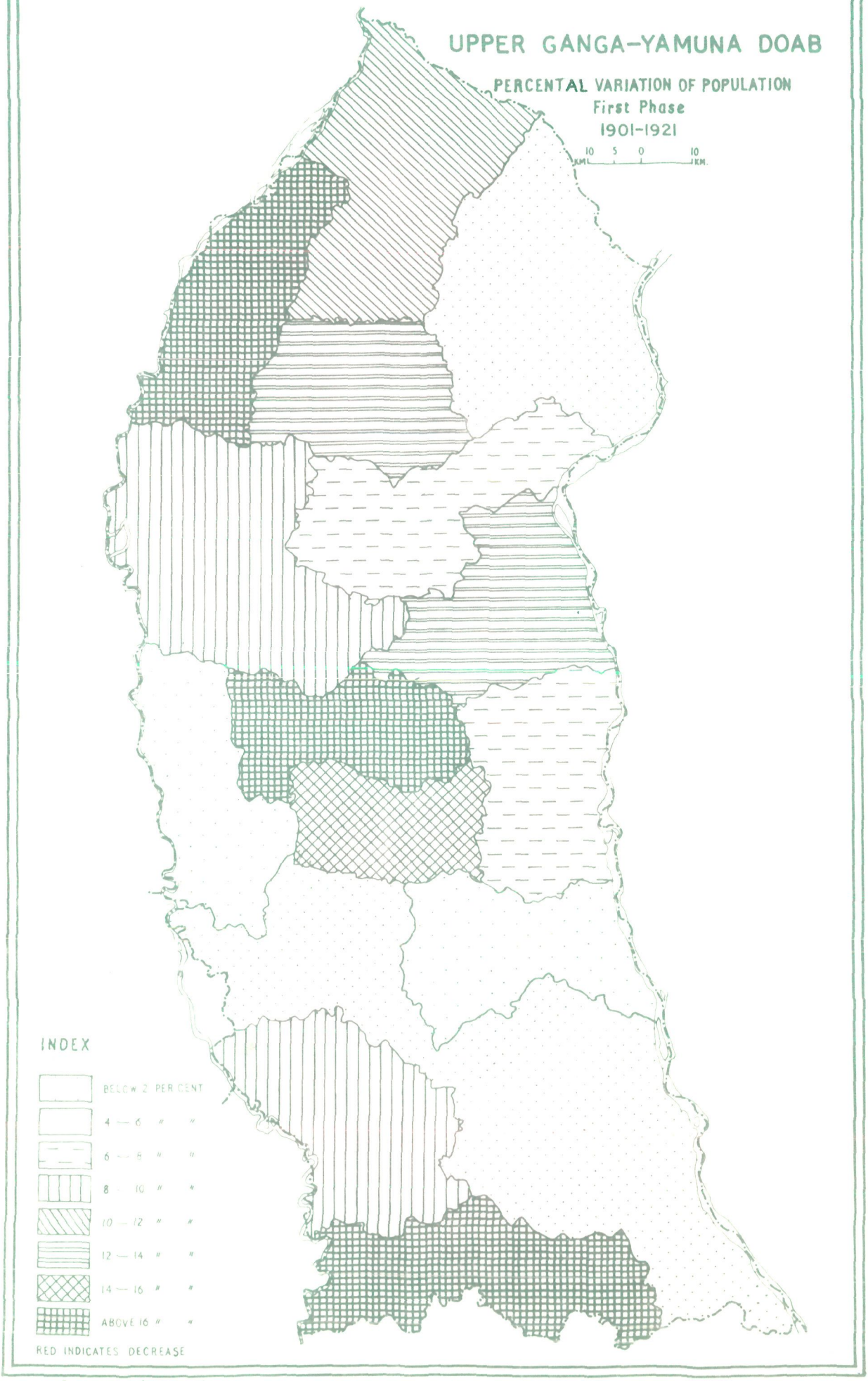
There were considerable regional variations in the rate of population growth during each of the three phases referred to in the preceding section. From table XX it will be seen that during the first two decades the population declined in all but three tahsils of Upper Doab. The three tahsils which did not suffer any loss but had an increase over 1901 population were Sardhana, Baghpat and Hapur all of Meerut district. Increase in Sardhana was fairly sizeable being about 17.9 per cent[1] whereas in the remaining two tahsils it was very nominal being 1.6 per cent and 1.0 per cent respectively.

TABLE XX
PERCENTAL VARIATION WITH 1901 AS BASE, SHOWING THE THREE PHASES OF THE DYNAMISM OF NUMBERS BY TAHSILS

Tahsil	1901 to 1921	1921 to 1931	1931 to 1951
1	2	3	4
Deoband	- 13.0	0. 5	21.00
Nakur	- 17.7	-12. 0	9.00
Roorkee	- 4.0	8. 0	43.00
Saharanpur	- 11.0	- 1. 0	34.00
Budhana	- 8.1	- 0. 3	34.00
Jansath	- 14.0	- 4. 0	30.00
Kairana	- 8.7	- 0. 5	40.00
Muzaffarnagar	- 7.4	11. 0	52.00
Baghpat	1.6	4. 8	40.03
Ghaziabad	- 4.9	1. 0	53.08
Hapur	1.0	8. 5	52.03
Mawana	- 7.4	- 0. 6	38.08
Sardhana	17.9	26. 4	69.00
Meerut	- 15.2	- 6. 7	41.08
Anupshahr	- 4.6	3. 7	39.00
Khurja	- 16.0	- 3. 1	27. 4
Sikandarabad	- 8.5	- 5. 0	21.06
Bulandshahr	- 3.8	3. 0	37.02

S O U R C E : Calculations based on data from Imperial and Provincial Tables Census of India, U.P. for various years and the District Census Handbooks, 1951.

1. This abnormal increase was almost entirely due to the addition of 88 square miles from the Meerut tahsil. This additional area was made a separate pargana and was named after the town of Daurala.



Source of Data - Census of India 1921, Vol. XVI, pt. II and Distt. Gaz. 1901

FIG. 21

The Saharanpur district was the worst sufferer amongst the four districts of Upper Doab. Three of the four tahsils of the district suffered a loss of more than 10 per cent. The greatest decrease was recorded in the tahsil of Nakur being 17.7 per cent. The tahsils of Deoband and Sahranpur had a decrease of 13.0 and 11.0 per cent respectively. On the other hand in the remaining three districts of Muzaffarnagar, Meerut and Bulandshahr there was only one tahsil each which suffered a loss of more than 10 per cent on the population of 1901. These tahsils were Jansath (Muzaffarnagar), Meerut , and Khurja (Bulandshahr) wherein the population declined by 16 per cent, 15.2 per cent and 14.0 per cent respectively. Thus six tahsils out of the eighteen tahsils of Upper Doab suffered a loss of more than 10 per cent on the population of 1901. The pattern of variation of population during the first phase of general decline is shown in Fig.21.

A decrease of less than 10 per cent but well above 5 per cent was recorded in the five tahsils namely Kairana, Budhana and Muzaffarnagar (of Muzaffarnagar), Mawana (of Meerut) and Sikandarabad (of Bulandshahr). Muzaffarnagar district was, therefore, the second worst sufferer as three of her four tahsils had a loss of more than 5 per cent and the fourth one of more than 10 per cent. The districts Meerut and Bulandshahr on the other hand, had one tahsil each with a loss of more than 5 per cent.

There were only four tahsils which suffered a loss of less than 5 per cent. In Bulandshahr and Anupshahr tahsils of Bulandshahr district the decrease was 3.8 and 4.6 per cent respectively. The Ghaziabad tahsil of Meerut district and the Roorkee tahsil of Saharanpur district lost by 4.9 and 4.0 per cent respectively.

The arrangement of tahsils according to the magnitude of decline in population is set out in table XXI. From the Fig.21 which is based on this table it will be seen that in general the decline in the population numbers

was of the highest magnitude in the northern section, of the medium order in the middle part and of the lower degree in the southern portion of Upper Doab.

TABLE XXI

GRADED ARRANGEMENT OF TAHSILS ACCORDING TO THE MAGNITUDE OF DECLINE DURING 20 YEARS FROM 1901-21

D E C R E A S E						INCREASE	
of more than 10%		of 5 to 10%		of less than 5%			
Tahsil	Actual percentage	Tahsil	Actual percentage	Tahsil	Actual percentage	Tahsil	Actual percentage
1	2	3	4	5	6	7	8
Nakur	17.7	Kairana	8.7	Ghaziabad	4.9	Sardhana	17.9
Khurja	16.0	Sikandarabad	8.5	Anupshahr	4.6	Baghpat	1.6
Meerut	15.2	Budhana	8.1	Roorkee	4.0	Hapur	1.0
Jansath	14.0	Mawana	7.4	Bulandshahr	3.8		
Deoband	13.0	Muzaffarnagar	7.4				
Saharanpur	11.0						

SOURCE: Same as that of Table XX.

The map shows that the areas which suffered high losses were mainly in the western and southern parts of Saharanpur district, the extreme easter and south-eastern parts of Muzaffarnagar district, the middle part of the Meerut district and the extreme southern part of the Bulandshahr district. A comparison with maps of soil and irrigation reveals that there was some discernable relation between the regional pattern of variation of population and the soil types and irrigation facilities. Similarly topography also

appears to have had some bearing on the spatial distribution of different rates of variation.

A notable relation also existed between the regional distribution of variation and the density of population. The decline in population seems to have varied inversely with the degree of population density. The tahsils of Saharanpur and Muzaffarnagar which belonged to the low density areas of the Upper Doab (having densities below the average for the whole region) suffered heavily whereas the western and extreme south-eastern tahsils of Meerut and the eastern tahsils of Bulandshahr belonged to medium to high density zone of Upper Doab (Table XXII) and were least affected by the general decline. In fact this zone contained all the three tahsils which recorded a gain over the population of 1901 during this period of general decline.

TABLE XXII

GRADED DISTRIBUTION OF DENSITIES OF POPULATION IN UPPER DOAB BY TAHSILS, 1921.

	DENSITY IN PERSONS PER SQUARE MILE							
Tahsil	LOW DENSITY below 500		MEDIUM DENSITY 500-650		HIGH DENSITY 650-750		VERY HIGH DENSITY Above 1050	
	Actual density	Tahsil	Actual density	Tahsil	Actual density	Tahsil	Actual density	
1	2	3	4	5	6	7	8	
Roorkee	391	Khurja	528	Buland shahr	671	Meerut	1055	
Jansath	410	Anupshahr	588	Baghpat	744			
Nakur	413	Ghaziabad	590					
Mawana	440	Hapur	604					
Kairana	455	Sardhana	621					
Sikandarabad	462	Budhana	631					
Saharanpur	476							
Muzaffarnagar	478							
Deobad	497							

SOURCE: Calculations based on data from Census of India, 1921, Vol.XVI United Provinces, part II., Imperial and Provincial Tables.

The tahsil Meerut, however, stood out as a bold exception to this general relation between variation and density. It is really difficult to hazard an explanation of this exception. The very judicious conclusion of Mr. Edye that " the tracts with the highest density tend most to increase in population " was rather strangely nullified by the behaviour of the population variation in this tahsil. Agricultural precariousness cannot be thought of as a possible cause as the tahsil and the district have always been agriculturally most prosperous.[3] For the absolute decrease in population no special cause seems to have been operating in Meerut. The density in the tahsil seems to have soared to more than 1,000 persons per square mile because of a loss of 88 square miles with an average density of approximately 504 persons per square mile against a density of about 921 persons per square mile for the whole tahsil in 1911. Consequently the area of the tahsil decreased to 275 square miles from 363 square miles in 1911 whereas the consequent

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2. Edye, E.H.H., Census of India 1921, U.P. of Agra and Oudh, Vol.XIV Part I-Report, Appendix A, p.4. The statement of this conclusion in unequivocal style with reference to Meerut and its tahsils was probably due to a miscalculation by Mr. Edye. The density of the tahsil is correctly given as 1055 persons per square mile but the percentage of variation which he has given as 2.2 in the side table on page 4 of the Appendix A is far from being correct. It is probably because of this wrongly calculated percentage that he has unqualifiedly applied the above quoted general conclusion to Meerut and its tahsils.
   According to the 1911 census the population of Meerut tahsil in 1911 was 334,466 but in 1921 the population declined to 290,063 persons (as also given in the side table of the appendix). These figures clearly indicate a loss of 44,403 persons or about 13.2 per cent of the 1911 population instead of an increase of 2.2 per cent as given by Edye.

3. ibid. Also see the District Gazetteer of Meerut 1922, p.35.

decrease in population was not commensurate with it. This unequal decrease in area and population resulted in an abnormally high density and tended to make Meerut tahsil a striking exception to the general variation-density relationshi referred to above.

One noteworthy point that seems to emerge from the variation density relation is that the general loss suffered by the four districts of Upper Doab can not possibly be attributed to over-pressure of population on the soil,[4] because if that would have been the case the general tendency would have been of relatively high decrease in the tahsils of higher densities

The principal cause of decline most probably was the general unhealthy conditions which prevailed during the last four years of the second decade. During this period Upper Doab districts were visited by severe epidemics of plague, cholera, malaria and influenza. These epidemics not only caused deaths to surpass births but also resulted in an increase in the number of emigrants and decrease in that of the immigrants. Decline in the number of immigrants was especially effective in the eastern tahsils bordering on the Ganga river. The khadir country along the bank of the Ganga, which is con-

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4. Edye reports that " it appears to suggest, what is also suggested by the population figures when examined from other points of view, that congested though the province may be, the limit of pressure of population on the soil is not yet in sight, and that in the absence of severe epidemics there is no present reason why the numbers of the people should not continue to increase." (Edye, E.H.H., op.cit.).

-siderably wider in the district of Muzaffarnagar, is one of the most precarious tracts of Upper Doab and contained, in 1921 a population which was mainly unsettled and migratory. In the event of the visitation of the epidemics these migratory people of the khadir might have gone to the adjoining districts and would have thought it wiser not to return to the badly hit eastern tahsils and have thus brought about a reduction in the population of these tahsils. This seems to be the plausible explanation of high decrease in the tahsil of Jansath.

The districts of Saharanpur and Bulandshahr had rather identical pattern of variation. In contrast to Meerut and Muzaffarnagar the worst affected tahsils of these districts were on the western side bordering on the left bank of Yamuna river. The khadir tract of Yamuna which occupies considerable portions of Dankaur and Dadri parganas is rather sandy and poor. This tract is as precarious, if not more, as the Ganga Khadir of Jansath. It, therefore, seems plausible that the precariousness combined with the severe spread of epidemic diseases in the closing years of the first two decades (1901-11 and 1911-21) might have acted as great deterrant to immigrants and would have also caused the death-rates to exceed, at least temporarily, the birth-rates. Similar position existed in the western section of the Khurja tahsil. Greater part of the Jewar pargana lies within the Yamuna Khadir tract. The whole pargana is relatively backward and though the soil is free from saline deposits (or. reh) it is rather poor and sandy. Canal irrigation facilities in Jewar were relatively meagre as here canal irrigation accounted for only 34 per cent against 54 per cent of the cultivated area in its immediat

neighbour the pargana of Khurja.[5]

Moreover the census report indicates that the neighbouring parts of the district of Aligarh, especially the northern parganas, were comparatively less effected by the devastation of the epidemics.[6] The high decline in the number of immigrants which surely affected the population of Khurja might thus, at least partially, be explained.

Nakur tahsil of Saharanpur is a relatively precarious tract as substantial portion of this tahsil is occupied by backwaters and abandoned channels of the Yamuna whereas in the interior away from the Yamuna the surface is much broken by shallow kathar (large areas of unreclaimed waste). Irrigation facilities are least in this tahsil. Only about 28 per cent of the cultivated area is under irrigation of which about 68 per cent is accounted for by wells which are rendered difficult and relatively less reliable by the sandy nature of the subsoil.[7] Similar precariousness is noticeable in the Deoband tahsil. The part of the tahsil lying in the Hindon-Kali Nadi Doab is for the most part sandy and scored with numerous ravines and bad lands. These western parganas and tahsils of the district were hard hit by plague at the close of the first decade and by influenza at the close of the second. These epidemics took heavy toll of life and forced the people to emigrate in large numbers. Many of these emigrants moved into the neighbouring tahsils of Punjab which were relatively free from these epidemics.[8] Since they had matrimonial relations with the people of the Punjab tahsils many of them migrated for good and did not return and thus

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5. District Gazetteer of Bulandshahr, 1903.
6. Eyde, E.H.H. op.cit., p.5 (Appendix A)
7. District Gazetteer of Saharanpur, 1903, pp.291-92
8. Census of India 1921. U.P. of Agra and Oudh Vol.XVI, Part I, Report p.2, Appendix A.

the population of the western parganas of Saharanpur suffered substantial loss during these two decades.

This analysis of the regional pattern of decrease indicates that the principal cause of the general decline in numbers was the repeated visita -tion of epidemics and that the effectiveness of this cause, in broader perspective, varied indirectly with the potential prosperity,and directly with the degree of precariousness of various tahsils and parganas of Upper Doab. And, since higher densities are naturally associated with relatively prosperous tracts this conclusion conforms well with the general incidence of the decline-density pattern discussed above.

CHAPTER V

SECTION III

SECOND PHASE OF VARIATION

The second phase of variation which began somewhere in the middle of the twenties was marked by a general tendency to redress the losses of the past two decades. Fifty per cent of the tahsils, that is, nine out of the eighteen had a definite gain over the 1901 population: the gain ranged from less than one per cent in Deoband to more than twenty-six per cent in Sardhana. The remaining fifty per cent of the tahsils could not recover from the past losses and still recorded a decline on the 1901 population which ranged from less than one per cent in the tahsils of Kairana, Budhana and Mawana to twelve per cent in Nakur tahsil. Tables XXIII and XXIV show the graded arrangement of the tahsils of gain and loss respectively during the second phase. The total gain of the nine tah-sils exceeded the total loss of the remaining nine and thus the population of Upper Doab as a whole managed to have a slight edge in 1931 over the population of 1901. In absolute numbers the net gain was 76,691 persons which meant an increase of 1.6 per cent.

TABLE XXIII

GRADED ARRANGEMENT OF TAHSILS ACCORDING TO THE MAGNITUDE OF INCREASE IN 1931 ON 1901

Percental increase of												
Less than 1		1 - 3		3-5		7-9		9-11		Above 25		
Tahsil	Increase	Tahsil	Increase	Tahsil	Increase	Tahsil	Increase	Tahsil	Increase	Tahsil	Increase	
1	2	3	4	5	6	7	8	9	10	11	12	
Deoband	0.5	Ghaziabad	1.1	Anupshahr	3.7	Roorkee	8.0	Muzaffar-nagar	10.5	Sardhana	26.4	
		Bulandsh-ahr	2.9	Baghpat	4.8	Hapur	8.4					

SOURCE : Calculations based on data from Census of India, U.P., Provincial Tables, 1901 and 1931.

TABLE XXIV

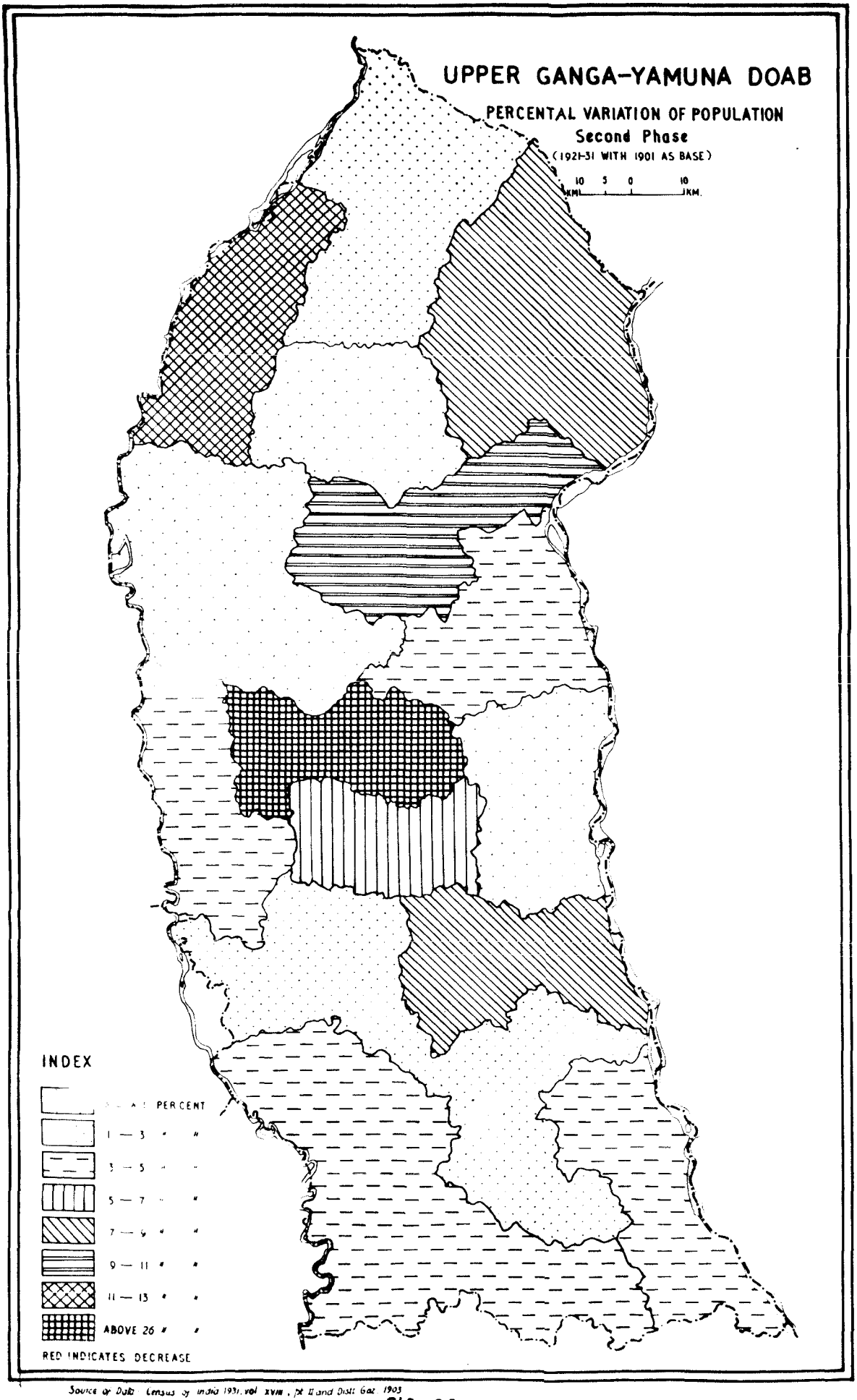
GRADED ARRANGEMENT OF TAHSILS ACCORDING TO THE MAGNITUDE OF LOSS IN 1931 ON 1901

Percental decrease of									
Less than 1		1 - 3		3 - 5		5 - 7		11-13	
Tahsil	Decrease	Tahsil	Decrease	Tahsil	Decrease	Tahsil	Decrease	Tahsil	Decrease
1	2	3	4	5	6	7	8	9	10
Budhana	0.3	Saharanpur	1.2	Khurja	3.1	Meerut	6.6	Nakur	11.2
Kairana	0.5			Jansath	3.7				
Mawana	0.6			Sikandara -bad	5.0				

S O U R C E : Calculations based on data from Census of India, U.P., Provincial Tables 1901 and 1931.

As regards the pattern of regional distribution the tahsils of gain seem to have formed a loop running from the north-eastern part of Saharanpur through the middle of Muzaffarnagar and western part of Meerut to the eastern and south-eastern tahsils of Bulandshahr (Fig.22). The tahsils which suffered less severely in 1921 were the principal gainers in 1931 whereas those which suffered badly did not make any clear gain. It may, however, be noted that the quantum of loss was comparatively less. The principal losers in 1931 were practically the same as they were in 1921. The tahsils of Nakur and Khurja recorded the highest decrease whereas tahsils of Meerut, Jansath and Sikandarabad came next in the descending order to be followed by Saharanpur, Kairana and Budhana tahsils.

PLATE XVII



Source of Data: Census of India 1931, vol XVIII, pt II and Distt Gaz 1903

FIG. 22

Nakur tahsil which still had a deficit of more than 11 per cent on 1901 population was badly hit by Yamuna floods in 1924.[1] Because of the floods many cultivators left the khadir tracts of the tahsil and migrated to the neighbouring Deoband tahsil which was beyond the reach of the flood waters. This partly explains decrease in Nakur and a marginal increase in the Deoband tahsil. Besides, there was also a movement of labour from Nakur tahsil westward into the Punjab and eastward into the Deoband tahsil especially into its municipal area.

The increase was relatively high in Roorkee tahsil being about 8 per cent of the 1901 population. This was mainly a natural increase. The tahsil has been better placed with regard to health conditions. It was the only tahsil of the district which suffered least from the epidemics of the closing years of the second decade. Besides relatively better health situation, the great influx of pilgrims to Hardwar has also been a constant factor in bringing about increase in the population of the tahsil. Many of these pilgrims would every year prefer to settle at or around Hardwar and increase the number of immigrants in the tahsil who caused the population to swell.[2] Relatively low decrease in the Sadar tahsil (i.e. Saharanpur tahsil) was infact a reflex of considerable increase in the Saharanpur municipality due to large scale immigration caused by springing up of new mills in the city. Otherwise the northern and western sections of the tahsil, in the parganas Muzaffarabad and Faizabad, suffered from greater losses than the tahsil average.

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1. Census of India 1931, U.P. of Agra and Oudh Vol.XVIII, part I, Report, pp. 72-73
2. District Gazetteers of the U.P. Agra and Oudh, Supplementary Notes and Statistics upto 1931-32, Vol.II(D), Saharanpur District, p.9.

The relative positions of various tahsils of Muzaffarnagar in 1921 in respect of population variation were strikingly maintained in 1931 also. The worst sufferer in 1931 was again the Ganga khadir tahsil of Jansath- still running at a loss of about 4 per cent on the population of 1901. Nevertheless it indicates a great recovery compared with the loss of about 14 per cent suffered in 1921. The deficit on 1901 population was very nominal in the tahsils Kairana and Budhana being only 0.5 and 0.3 per cent respectively. In contradistinction to these three tahsils the Muzaffarnagar tahsil recorded a substantial gain of about 11 per cent on its 1901 population. It was a great recovery because at the 1921 census the tahsil had suffered a loss of more than 7 per cent. The abnormal increase of almost three times the provincial average in Muzaffarngar tahsil was largely due to the amazing growth in the township of the district headquar--ters. Within the third decade the town increased its population by 35 per cent as a result of increased immigration caused partly by the pull exercised by the fast expanding opportunities of gainful employment in and around the municipal area and partly to the push of agricultural troubles of the later years of the decade.[3] On the whole the district had a net gain of 17,474 persons or about 2.0 per cent of the 1901 population. It may also be noted that increase in the births over deaths was also a significant factor in more than wiping out the deficit of 1921. According to the vital statistics the survival rate of 14.1 in the district during the twenties was the second highest in the province (the highest being 14.4 in Agra district). This is suggestive of notable improvement in the health situation in the district.

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3. Census of India 1931, U.P. of Agra and Oudh, Vol.XVIII part I-Report p.77.

In Meerut district only two tahsils namely Meerut and Mawana failed to make a gain on their 1901 population. Meerut was infact much on the deficit --still trailing by 6.6 per cent behind 1901 total whereas Mawana was short of its 1901 population by only 0.6 per cent. The remaining four tahsils recorded considerable increase. Sardhana tahsil with a gain of 26.4 per cent had the highest increase in the Upper Doab. Although Meerut tahsil showed a loss of 6.6 per cent on 1901 it made considerable gain on 1921 population during the decade 1921-31; the increase during the decennium being 10.1 per cent which was the highest for the decade in the district. The fact that the Sadar tahsil (i.e. Meerut tahsil) was still trailing behind the 1901 population was chiefly due to the abnormal loss which the tahsil had to suffer in 1921 as a result of the outburst of epidemics in the closing years of the preceding decade. The district was worst hit and the years 1916-17, 1917-18 and 1918-19 were the most horrible years of fever, plague and influenza epidemics.[4] Thus in spite of the large increase in the Meerut city - the biggest in the region -- the Sadar tahsil could not but merely reduce its big deficit of 1921. The city population increased by 17.2 and 11.5 per cent during the second and third decade respectively.

Sardhana's abnormal increase seems to be mainly due to its very high degree of prosperity. The bulk of Sardhana pargana is composed of very good level upland of excellent soil. Similarly the soil of the Barnawa pargana on the western side of the tahsil is very much comparable with that

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4. District Gazetteers of the U.P. of Agra and Oudh, Supplementary Notes and Statistics, Vol.IV-(C), Meerut District, p.1.

of Sardhana and is of very good quality especially in the south of the Kirsani river.[5] Sardhana tahsil had also the distinction of recording the highest increase in Upper Doab in 1921.

Tahsils Baghpat and Ghaziabad are agriculturally very prosperous. The middle section of Baghpat pargana between the Yamuna and the Kirsani rivers contains wide tracts of rich dark loam of exceeding fertility. Similarly the major part of pargana Chhaprauli has a black soil. In Ghaziabad the parganas of Jalalabad and Dasna contain fairly good soil though Loni pargana is rather notoriously precarious. In view of such a high degree of prosperity the relatively small gains of 4.8 per cent in Baghpat and 1 per cent in Ghaziabad do not seem reasonably comparable with the agricultural situation of the area. The relatively low increase was probably due to considerable migration to Delhi in particular and to some rapidly developing close-by towns of Punjab in general.[6]

Hapur infact is not a very prosperous tahsil. Major part of the tahsil has bad and poor soils: bhur and reh have considerable extent. The increase in population of 8.4 per cent which the tahsil recorded in 1931 was partly due to increase in the Hapur municipality and partly to improvement in the general health conditions causing notable increase in survival rate. The population of Hapur town, which is the greatest centre of grain commerce and trade, increased by about 23.5 per cent of its 1921 population compared with an increase of 7.4 per cent in the whole of the tahsil.

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5. District Gazetteer of Meerut, 1903, pp.207 and 305-306.

6. Census of India 1931, U.P. of Agra and Oudh, Vol.XVIII, Part I-Report, p.77.

On the whole the district had a net gain of 61,743 persons or about 4.0 per cent on the 1901 population.

Bulandshahr district appears to have been divided into two sections (1) the western section of deficit tahsils comprising Sikanderabad and Khurja and (2) the eastern section of growing population comprising the tahsils of Anupshahr and Bulandshahr. Thus the relative inter-tahsil position of 1921 was maintained in 1931.

It has already been noted that the western half of the district is relatively precarious and suffers from the maladies of ravines, floods, reh and sandy ridges. According to the district gazetteer records the tahsil of Sikandarabad suffered most severely from the Yamuna floods of 1924: " Many villages were swept away and those who escaped with their lives migrated elsewhere through fear, and on account of the unhealthiness resulting from the floods."[7] This caused substantial reduction in the population of the tahsil. The recovery from this sudden loss was rather slow owing to the general precariousness of the area and consequently the population of the tahsil was in defect of the 1901 total even at the time of 1931 census.

Besides these natural factors, the rapid growth of industries in Delhi which lay close by exerted considerable pull on the population of the tahsil. During the decade 1921-31 fairly large number of persons migrated out of the tahsil to work as labourers in the factories of Delhi and New Delhi.

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7. Census of India 1931, U.P. of Agra and Oudh, Vol.XVIII, Part I-A-Report, p.78.

The situation in Khurja was not much different. The relatively precarious pargana of Jewar suffered badly from the 1924 floods. In the northern part of pargana Khurja there runs a belt of poor sandy soil from Dastura in the north-western corner to Khurja town and then proceeds towards south-east along the Grant Trunk Road. The pargana also contains extensive usar and barren lands which have considerably reduced the prosperity index of the tahsil. The eastern most pargana of Pahasu is virtually divided into two halves by the Kali Nadi: The western half is edaphically excellent and the best in the district whereas the eastern half is inferior with abundance of sand in the soil and unevenness of the surface.[8] On the whole, therefore, the tahsil did not possess sufficient potential prosperity to wipe off the heavy loss which it had sustained in the earlier decades. The improvements in the health situation during the decennium helped the tahsil only as much as to gain an increase of 15,640 persons or 6.4 per cent of the population of 1921 whereas it was still short of her 1901 population by 8,377 persons or about 3.1 per cent.

Tahsils Anupshahr and Bulandshahr had nearly equal percentages of increase namely 3.7 and 2.9 per cent respectively. With the exception of the khadir tracts of the Ganga in the extreme east and of Kali Nadi and Chohiya Nadi in the middle the soil of the two tahsils is fair by good.[9] The prosperity level of these tahsils is of an average degree and, therefore, when the district cleared the unhealthy years of the second decade the natural growth of population took its own course to which the edaphic

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8. District Gazetteer of Bulandshahr, 1903, pp. 216-17; 222-24; 243-45; 260-61; 275-76; 300-01.
9. District Gazetteer of Bulandshahr, 1903, pp. 168-69; 173-74; 184-85; 194-95; 230-31; 291-93; 308-09.

and agricultural situation was no deterrent and the population not only managed to wipe off the 1921 deficit but also to gain a combined increase of 20,125 persons (10,177 in Anupshahr and 9,948 in Bulandshahr) on the 1901 population.

On the whole the district was still trailing behind its 1901 population by a margin of 1,216 persons or a deficit of approximately 0.1 per cent of the population at 1901 census.

Thus the position at the close of the second phase was that the two bounding districts of Upper Doab namely Saharanpur and Bulandshahr were still running from a loss of 1,310 and 1,216 persons respectively on their 1901 population, whereas the two middle districts of Muzaffarnagar and Meerut had exceeded their 1901 population by a margin of 17,474 and 61,743 persons respectively. On the whole, therefore, Upper Doab had an excess of 76,691 persons on its population at the beginning of the century. In terms of percentage this amounted to only slightly more than one which, therefore, clearly suggests a smoothening of the losses of the previous two decades and restoration of the 1901 numbers of the population. This stage of equalization then marked the beginning of the third phase of continuous and rapid increase in the numbers of the population of the region as a whole as well as its constituent districts and tahsils.

Before discussing the general pattern and detailed quantum of varia-tion in the third phase it seems worth its while to examine briefly the intercensal variations during the first three decades of the century. Table XXV sets out the absolute and percental variations for the three decades from 1901 to 1931 by districts and tahsils. From the examination of the table and the maps drawn on the basis of this table (figs.14,15 & 16)

it will be seen that the decline in population was widespread and progressive from 1911 and reached its crest in 1921.

During the decade 1921-31, however, there was not a single tahsil which suffered a loss although half of the tahsils as noted earlier were still on the deficit of the 1901 population. The intercensal decennial position, therefore, gives a definite indication of an overall increase in the population of Upper Doab and shows how quick the population of these districts was to redress the losses which it sustained during the epidemic-strucken years of the second decade. The increase as indicated in the tables XXVI,XXVII, XXVIII and XXIX was mainly due to natural growth and was suggestive of some improvement in the living conditions and in the measures of protection against diseases especially the epidemics. That the epidemics especially plague, influenza and other fevers have been the principal factors affecting the quantum of the natural growth during the decade is clearly emphasized by the vital statistics for the three abnormally lean years namely 1924,1925 and 1926 given in table XXX. With the exception of these three years the natural growth in all the years of the decennium was generally above the normal rate of survival for the decade (vide tables XXVI,XXVII,XXVIII and XXIX). This disease control of population growth is indirectly suggestive of the fact that the limit of pressure of population on the soil was not yet reached so that when the effective measures of protection against the spread of epidemics were adequately provided the population began to multiply in the normal course of its natural growth. This growth continued in the following fourth and fifth decades which,incidentally,constitute the third phase of the growth of population in Upper Doab.

TABLE XXV

ABSOLUTE AND PERCENTAL INTERCENSAL VARIATIONS BY TAHSILS FROM 1901- 1931

District and Tahsil	Variation in the decade (+ Increase - Decrease)					
	1901-11		1911-1921		1921-1931	
	Absolute	Percent	Absolute	Percent	Absolute	Percent
1	2	3	4	5	6	7
Deoband	-15851	-7.2	-12857	-6.3	+29766	+15.5
Nakur	-23760	-11.6	-8091	-4.4	+11393	+6.6
Roorkee	+4257	+1.4	-14838	-5.1	+32823	+11.9
Saharanpur	-23517	-7.0	-13102	-4.2	+32467	+10.9
District Total	-58871	-5.6	-48898	-5.0	+106449	+11.4
Budhana	-20068	-10.2	+4027	+2.3	+15381	+8.5
Jansath	-16547	-7.4	-13451	-6.8	+21917	+11.9
Kairana	-20094	-8.9	+447	+0.2	+20698	+10.1
Muzaffarnagar	-12119	-5.1	-5118	-2.2	+42401	+19.1
District Total	-68828	-7.8	-14095	-1.7	+100397	+12.7
Baghpat	-3223	-1.1	+7841	+2.2	+9788	+3.2
Ghaziabad	+2230	+0.8	-15643	-5.6	+16533	+6.4
Hapur	+8200	+3.4	-5732	-2.3	+18151	+7.4
Meerut	-7677	-2.2	-44403	-13.3	+29298	+10.1
Mawana	-2865	-1.4	-11986	-6.1	+13689	+7.4
Sardhana	-17476	-9.7	+49635	+30.5	+15383	+7.2
District Total	-20811	-1.4	-20290	-1.3	+102848	+6.9
Anupshahr	-1163	-0.4	-11782	-4.3	+23122	+8.7
Bulandshahr	+958	+0.3	-13705	-6.2	+22695	+6.4
Khurja	-7998	-3.0	-16019	-4.1 ~~-6.2~~	+15640	+3.9
Sikandarabad	-6106	-2.3	-15767	-6.2 ~~-4.1~~	+8909	+7.1
District Total	-14309	-1.3	-57273	-5.1	+70366	+6.6

SOURCE : Calculations based on data from Provincial Tables, Census of India, North-western Provinces and Oudh and U.P. of Agra and Oudh, 1901, 1911, 1921 & 1931.

TABLE XXVI

YEARLY BIRTH AND DEATH-RATES IN SAHARANPUR DISTRICT DURING THE THIRD DECENNIUM

Year	Births		Deaths		Survival rate per 1000
	Total	Rate per 1000	Total	Rate per 1000	
1	2	3	4	5	6
1922	41563	44.34	22912	24.44	19.90
1923	41583	44.36	25163	26.84	17.52
1924	36901	36.39	29546	31.52	04.87
1925	38387	40.95	29587	31.56	09.39
1926	39639	42.28	35363	37.72	04.56
1927	40503	44.06	29314	31.44	12.62
1928	44247	47.32	32175	34.30	13.02
1929	42443	45.29	29933	31.92	13.37
1930	45593	48.62	30900	32.96	15.66
1931	45165	48.17	33571	35.81	12.36
TOTAL	416024	44.18	298464	31.85	12.33

S O U R C E : Adapted from Table III, p.(iii); District Gazetteers of the United Provinces of Agra and Oudh - Supplementary Notes and Statistics, Vol.II (D), Saharanpur District, 1934.

TABLE XXVII

YEARLY BIRTH AND DEATH-RATES IN MUZAFFARNAGAR DISTRICT DURING THE THIRD DECENNIUM.

Year	Births		Deaths		Survival rate per 1000
	Total	Rate per 1000	Total	Rate per 1000	
1	2	3	4	5	6
1922	28,273	35.59	12,259	15.43	20.16
1923	32,410	40.81	14,336	18.05	22.76
1924	29,895	37.63	15,659	18.57	19.06
1925	30,290	38.13	24,053	30.28	7.85
1926	27,553	34.66	26,897	33.86	0.80
1927	29,838	37.70	18,745	23.60	14.10
1928	34,431	43.31	22,543	28.38	14.93
1929	33,697	42.42	19,703	24.80	17.62
1930	34,746	43.74	18,828	23.70	20.04
1931	36,896	46.45	17,042	21.45	25.00
TOTAL	318,029	40.04	190,065	23.81	16.23

S O U R C E : Adapted from Table III, p.(iii); District Gazetteers of the United Provinces of Agra and Oudh - Supplementary Notes and Statistics, Vol.III (D) Muzaffarnagar District, 1934.

TABLE XXVIII

YEARLY BIRTH AND DEATH-RATES IN MEERUT DISTRICT DURING THE THIRD DECENNIUM

Year	Births		Deaths		Survival rate per 1000
	Total	Rate per 1000	Total	Rate per 1000	
1	2	3	4	5	6
1922	62,968	42.00	32,351	21.58	20.42
1923	63,675	42.47	36,962	24.66	17.81
1924	62,266	41.54	52,437	34.98	06.56
1925	61,097	40.76	54,980	36.67	04.09
1926	54,396	36.28	56,141	37.45	01.17
1927	57,774	35.54	37,377	24.93	10.61
1928	63,758	42.53	35,177	23.46	19.07
1929	59,590	39.70	36,747	24.51	15.21
1930	59,133	39.46	34,264	22.86	16.60
1931	61,783	41.76	32,396	21.61	20.15
TOTAL	596,380	40.20	408,832	27.27	12.93

S O U R C E : Adapted from Table III, p. (iii); District Gazetteers of the United Provinces of Agra and Oudh - Supplementary Notes and Statistics, Vol.IV(D), Meerut District, 1935.

TABLE XXIX

YEARLY BIRTH AND DEATH-RATES IN BULANDSHAHR DISTRICT DURING THE THIRD DECENNIUM

Year	Births		Deaths		Survival rate per 1000
	Total	Rate per 1000	Total	Rate per 1000	
1	2	3	4	5	6
1922	42,071	40.29	26,203	24.57	15.72
1923	50,079	46.95	32,736	30.69	16.26
1924	47,019	44.08	44,321	41.56	02.52
1925	42,924	40.25	48,972	45.92	05.67
1926	38,859	36.43	39,272	36.82	00.39
1927	46,448	43.55	27,163	25.47	18.08
1928	48,983	45.93	26,614	24.95	20.98
1929	46,170	43.29	27,825	26.09	17.20
1930	48,756	45.71	31,344	29.39	16.32
1931	53,032	46.64	31,069	27.32	19.32
TOTAL	464,331	43.31	335,519	31.28	12.03

S O U R C E : Adapted from Table III, p.(iii); District Gazetteers of the United Provinces of Agra and Oudh - Supplementary Notes and Statistics, Vol.V (D), Bulandshahr District, 1934.

TABLE XXX

MORTALITY FIGURES DUE TO PLAGUE AND FEVERS
DURING THE THREE YEARS: 1924 to 1926

District	Year	Deaths from all causes	Deaths from Plague	Deaths from Fevers	Total of 4 and 5	Death average for the decade 1921-30 due to Plague	Death average for the decade 1921-30 due to Fevers
1	2	3	4	5	6	7	8
Saharanpur	1924	29656	1	26379	26380	1456	24266
	1925	29487	276	26274	26550		
	1926	35363	2215	29713	31928		
Muzaffarnagar	1924	15,659	9	15,049	15,058	1,111	16,698
	1925	24,053	951	22,000	22,951		
	1926	26,897	3,191	22,549	25,740		
Meerut	1924	52,437	14,518	34,315	48,833	3,427	37,371
	1925	54,980	8,670	42,901	51,571		
	1926	56,141	4,939	47,710	52,649		
Bulandshahr	1924	44,321	12,975	29,544	42,519	2,584	31,307
	1925	48,972	9,246	35,851	45,097		
	1926	39,272	2,473	33,954	36,427		

S O U R C E : District Gazetteers of the United Provinces of Agra and Oudh, Supplementary Notes and Statistics, Vols. II to V. Table IV, p.iv.

CHAPTER V

SECTION IV

THIRD PHASE OF VARIATION

The third phase of relatively rapid and steady increase began from the early years of the fourth decade. The increase in numbers was widespread in the whole of Upper Doab. On the average the increase in the region amounted to 38.16 per cent of the 1901 population. Ten out of the eighteen tahsils recorded as increase above this average. The increase in these tahsils ranged from 69 per cent in Sardhana to 38.8 per cent in Mawana. In the remaining eight tahsils the increase was below the Upper Doab average and ranged from 9.0. per cent in Nakur tahsil to 37.2 per cent in Bulandshahr tahsil. Table XXXI sets out the graded arrangement of above-the-average and below-the-average tahsils with absolute and percental increase. It will be noted from the table that Meerut district was most conspicuous for having all of its six tahsils recording an increase above the Upper Doab average whereas in Muzaffarnagar there were two tahsils and in Saharanpur and Bulandshahr only one tahsil each which had an increase above this average. The tahsils in which the increase was below the Upper Doab average were mainly peripheral lying either along the Yamuna or the Ganga river. This general regional pattern of growth was very muc identical with that of the growth at the end of the second phase. The loop formed by the tahsils of gain in the second phase was formed in the third phase by the tahsils recording an increase greater than the Upper Doab average. The marginal tahsils which were yet on the deficit in 1931 had an increase below the average in 1951.

TABLE XXXI

GRADED DISTRIBUTION OF PERCENTAGES OF INCREASE OF POPULATION BY TAHSILS DURING FIFTY YEARS, 1901-51

Above-the-average tahsils			Below-the-average tahsils		
Tahsil	Absolute increase	Percent increase	Tahsil	Absolute increase	Percent increase
1	2	3	4	5	6
Sardhana	124320	69.0	Bulandshahr	123439	37.2
Ghaziabad	148669	57.4	Budhana	67928	34.5
Hapur	127386	52.3	Saharanpur	113295	33.8
Muzaffarnagar	123730	51.7	Jansath	63853	29.4
Roorkee	123884	43.2	Khurja	73361	27.5
Meerut	143092	41.8	Sikandarabad	56389	21.6
Baghpat	119811	40.3	Deoband	46808	21.3
Kairana	89069	39.6	Nakur	24419	12.0
Anupshahr	108594	39.1			
Mawana	77764	38.8			

S O U R C E : Calculations based on data from Census of India, U.P. 1901 and 1951.

On district level the highest increase was recorded in Meerut and the lowest in the district of Saharanpur. It is, however, noteworthy that even the lowest percental increase of 29.4 was very nearly equal to the average increase of 32.5 per cent for the whole State of U.P. (table XVII). Increase in Muzaffarnagar (39.5 per cent) was much above the State average though only slightly above the Upper Doab average. The increase in Meerut district (49.6 per cent) was ~~almost 20~~ about 17 per cent above the State average and a little

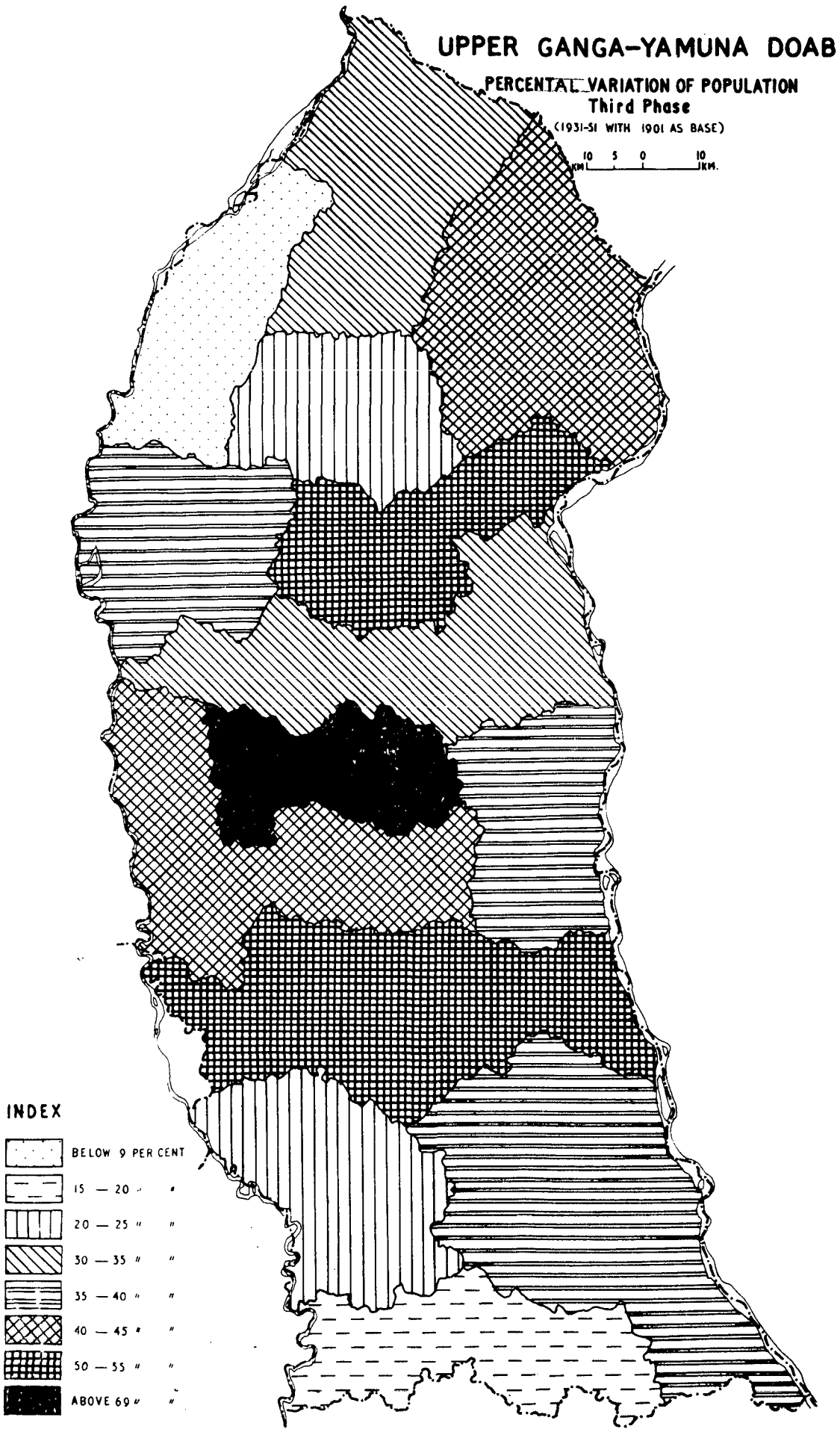
over 11 per cent above the Upper Doab average. Even the increase in Bulandshah (31.9 per cent), though considerably below the Upper Doab average, was almost equal to the average for the State.

This general widespread increase was mainly a result of the natural growth of population brought about by amelioration in the epidemic situation. Migration was also in certain districts a significant factor in the rapid growth of population during the third phase.

The areal distribution of the growth of population seems to have been under the direct influence of three factors namely (1) the character of soil and the level of agricultural prosperity, (2) the growth of urban centres, and (3) the health conditions. But it will be seen from the following details that the effect of these factors on the growth of population has varied from district to district and from one part to another within a district.

SAHARANPUR DISTRICT.

The district of Saharanpur could easily be divided into four regions of very low, medium, and high percentage of growth as shown in Fig. 23 and table XXXII. The low percentage area was mainly on the western side of the district in the Yamuna and the Kirsani khadir and on the northern side in the submontane pargana of Faizabad in the extreme north-west of the district. As has already been noted the khadir parts of the parganas of Nakur tahsil are rather precarious because of their vulnerability to the Yamuna floods, and due to the abundance of bad lands, ravines and tracts of sand infected soils. Besides, numerous braded channels and backwaters of the Yamuna have made certain diseases such as malaria epidemic in the western parts of the parganas of Nakur tahsil.



Source of Data: Distt. Census Handbooks 1951 and Distt. Gaz. 1903

FIG. 23

TABLE XXXII

INTERCENSAL POPULATION VARIATION BY PARGANAS,
DISTRICT SAHARANPUR, 1901 - 1951

Pargana	Population		Variation	
	1951	1901	Absolute	Percent
1	2	3	4	5
Deoband	104,822	81,652	23,170	28.4
Rampur	85,667	75,628	10,035	13.3
Nagal	76,471	62,872	13,599	21.6
Tahsil Deoband	266,960	220,152	46,808	21.3
Nakur	61,050	54,707	6,343	11.6
Sarsawa	44,540	41,698	2,842	6.8
Sultanpur	49,815	48,685	1,130	2.3
Gangoh	72,508	58,404	14,104	24.1
Tahsil Nakur	227,913	203,494	24,419	12.0
Manglaur	100,122	78,019	22,103	28.3
Jawalapur	122,485	71,824	50,661	70.5
Bhagwanpur	85,823	70,312	15,511	22.1
Roorkee	102,357	66,748	35,609	53.3
Tahsil Roorkee	410,787	286,903	123,884	43.2
Faizabad	64,199	55,915	8,284	14.8
Muzaffarnagar	77,258	62,510	14,748	23.6
Haraura	73,198	65,046	8,152	12.5
Saharanpur	233,321	151,210	82,111	54.3
Tahsil Saharanpur	447,976	334,681	113,295	33.8

S O U R C E : District Gazetteer of Saharanpur and Census of India 1951, U.P.,Distric Census Handbook of Saharanpur.

The region of medium growth lay in the middle of the district comprising the parganas of Deoband, Nagal, Manglaur, Bhagwanpur and Muzaffarabad. This belt was on the whole a relatively fertile and prosperous tract, though in the northern parts of Bhagwanpur and Muzaffarabad parganas malaria was highly endemic.

The parganas of Saharanpur and Roorkee recorded high increase of more than 50 per cent of the 1901 population. This was much above the average of both the Upper Doab and the State. Besides having considerable areas of good soil, these parganas had the additional advantage of the presence of the towns of Saharanpur and Roorkee. The rapid urban developments in these two towns have attracted a good deal of persons from the surrounding areas whereas the emigrants from West Pakistan around and after 1947 mainly elected to settle in the principal towns of the district especially the Saharanpur city.

The Jwalapur pargana which recorded the highest increase of more than 60 per cent presents rather an exceptional case . Save the small hilly tract in the north the entire pargana is in the lowlands of Ganga khadir. Below the northern submontane tract there are large areas of waste and swamp along the Ben Ganga river and the soil is rather stiff and foul with weeds. South of the submontane tract and below the swampy area the soil is fairly fertile.[1] Moreover, in the northern parts the malaria is endemic. On the whole, therefore, the general conditions of soil and health do not seem to justify the highly abnormal magnitude of the increase of population in this eastern most pargana of Roorkee tahsil. The only plausible explanation of this high increase seems to be the presence of Hardwar city in the pargana. Hardwar is one of the most sacred places of Hindu pilgrimage. Every year hundreds of thousands of pilgrims visit Hardwar and quite many of them settle down there permanently. Besides the pilgrim attraction, Hardwar being the second largest

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1. District Gazetteer of Saharanpur, 1903, pp. 261-62

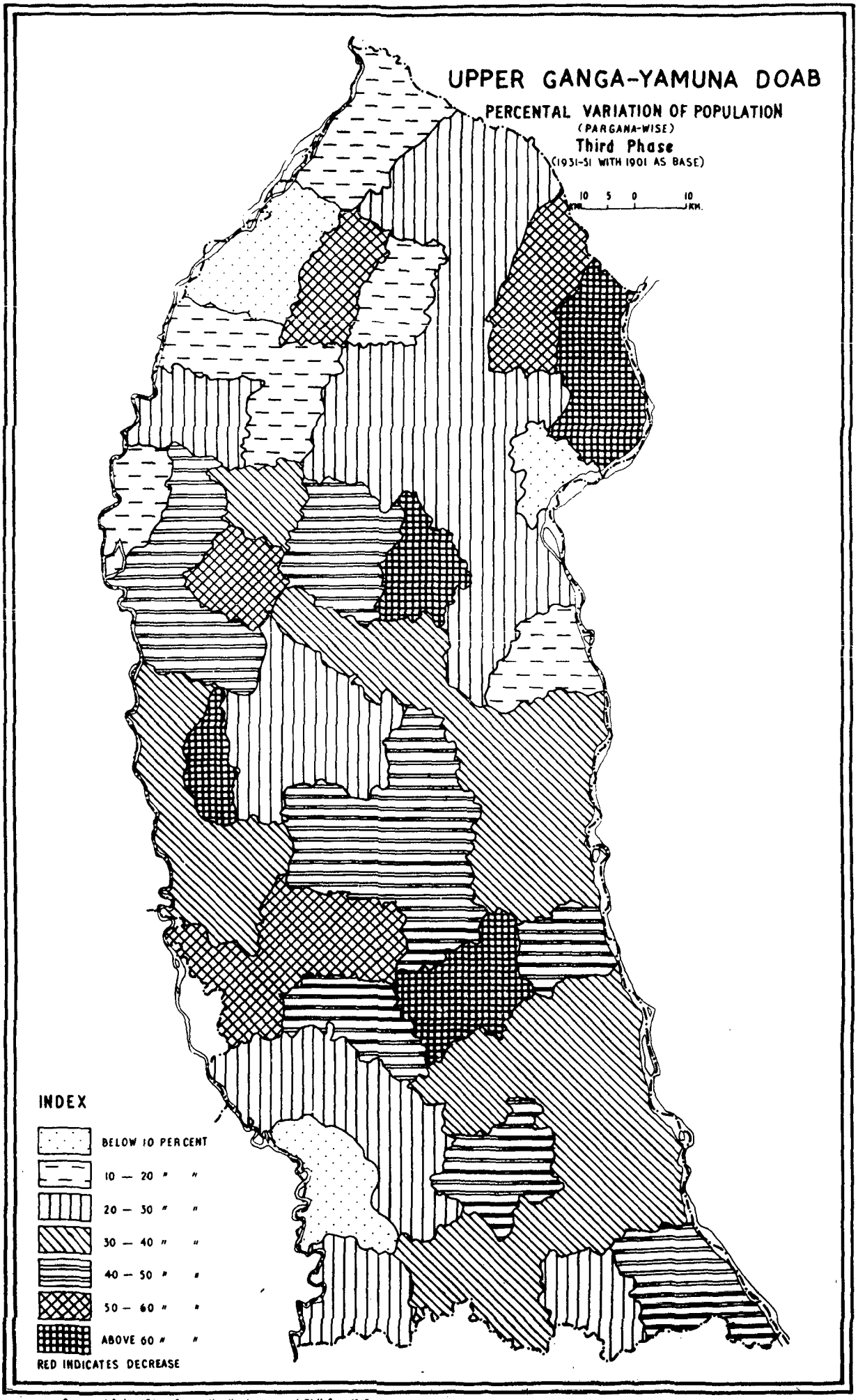
city of the district had also the advantage of the urban pull. After 1947 it also did receive a great number of Pakistani emigrants. Table XXXIII shows the percental break-up of population in the I and II class cities of Upper Doab by birth-place in 1951. It will be seen from the table that 42.7 per cent of Hardwar's population was from outside the Saharanpur district. Hardwar thus had second highest percentage of emigrants among the cities of Upper Doab while it ranked fourth amongst the sixteen principal cities of the State (being surpassed only by Kanpur, 52.2 per cent, Dehra Dun, 67.0 per cent, and Ghaziabad, 45.6 per cent).

TABLE XXXIII

PERCENTAGE OF POPULATION IN CITIES BY BIRTH-PLACE
1951

City	District of enume -ration	Other distt. of the same natural division	Other parts of the State	Adjacent States	Other parts of India	Pakistan	Other terri -torie
1	2	3	4	5	6	7	8
Ghaziabad	54.4	7.0	3.4	6.3	0.5	28.3	0.1
Hardwar	57.3	6.5	6.0	4.2	0.5	25.0	0.5
Saharanpur	60.3	6.5	4.1	4.5	0.8	23.6	0.2
Meerut	65.3	7.5	3.9	7.2	2.0	13.9	0.2
Muzaffarnagar	70.0	10.4	1.5	4.9	0.6	12.5	0.1

S O U R C E : Census of India 1951, Vol.II, Uttar Pradesh, Part I-A, Report, p.173.



Source of Data: Distt. Census Handbooks, 1951 and Distt. Gaz. 1903

FIG. 24

MUZAFFARNAGAR DISTRICT

In Muzaffarnagar the lowest increase was recorded in the eastern quarter of the district comprising the parganas of Gurdhanpur, Purchapur, Bhukerheri, Jansath and Sambalhera (table XXXIV and Fig. 24).

TABLE XXXIV

INTERCENSAL POPULATION VARIATION BY PARGANAS, DISTRICT MUZAFFARNAGAR, 1901 - 1951

Pargana	Population		Variation	
	1951	1901	Absolute	Percent
1	2	3	4	5
Shikarpur	92,004	68,004	24,000	35.3
Kandhla	109,833	78,036	31,797	40.7
Budhana	63,125	50,994	12,131	23.8
Tahsil Budhana	264,962	197,034	67,928	34.5
Khatauli	92,770	67,336	25,434	37.7
B. Sambalhera	48,922	42,143	4,779	11.3
J. Jansath	69,152	53,314	15,938	29.7
Bhokerheri	69,420	53,618	15,802	29.4
Tahsil Jansath	280,264	216,411	63,853	29.4
Thana Bhawan	67,066	50,846	16,220	31.9
Shamli	106,490	67,210	39,280	58.4
Kairana	62,437	45,004	18,433	40.9
Jhinjhana	60,451	41,897	18,554	44.2
Bidauli	16,304	19,722	- 3,418	-17.3
Tahsil Kairana	313,748	224,679	89,069	39.6
Gurdhanpur	12,791	12,345	446	3.6
Purchhapur	57,015	44,150	12,865	29.1
Chartawal	65,556	45,666	19,890	43.5
Baghra	82,811	57,486	25,325	44.1
Muzaffarnagar	144,621	79,414	65,207	66.9
Tahsil Muzaffarnagar	362,794	239,064	123,730	51.7

S O U R C E : District Gazetteer of Muzaffarnagar and Census of India 1951,U.P., District Census Handbook of Muzaffarnagar.

Greater part of these parganas lies in the Ganga khadir and is more suited to grazing than to large scale permanent agriculture. Practically the whole of the Gurdhanpur pargana consists of swampy inferior tract laying between Solani Nadi and the Ganga river. The khadir is as much as 12 miles broad in the northern part and gradually narrows southwards. The high banks of Ganga have numerous cliffs which are broken by sandy ravines sometimes as high as 100 feet. The situation in Sambalhera is in no way better. The extreme eastern section is exposed to the menance of frequent changes in the course of Ganga and is traversed by numerous water courses. The soil is much waterlogged The middle and western part, on the other hand, is composed of khadir tract traversed by two broad sand belts running southward from near Miranpur village. On the whole the khadir beyond the uplands is much strongly sandy than anywhere else. Similarly the parganas of Parchapur, Bhukerheri and Joli Jansath are over run by three sandy belts which start from Purchapur and run south-westward to enter Muzaffarnagar and then towards south and south-east into Bhukerheri and Joli Jansath. In the north-western part of Purchapur a belt of undulating ridges of sand runs between the Kali Nadi khadir and the upland whereas in the north-estern part a broad sandy plain extends some distance along the Ganga canal. These tracts are classed as inferior in natural fertility. Bhukerheri is very similar to Sambalhera in the south. The major part of the pargana consists of highly sandy soil traversed from north to south by seven distinct lines of sandhills of which the western lines are infact the continuation of the Purchapur sand belts. The Joli Jansath pargana is traversed by the three sandy belts coming from Purchapur. The sandy plain in the northern part of the pargana extending over a width of about three miles is one of the poorest in the district. Thus the whole of the eastern quarter of the district is distinctly precarious and does not contain any sizeable town of noticeable urban

attraction. Moreover, the presence of water-logged and swampy tracts go to the detriment of the health situation.[2] These circumstances seem to explain the low percentage of increase and suggest that the population dynamics is under the direct influence of rain, river and the soil.

The middle and western parts of the district, with the exceptions of pargana Muzaffarnagar and in the former and pargana Shamli in the latter, comprise the area of medium increase. The parganas of Thana Bhawan, Jhinjhana Kairana, Kandhla, Shikarpur, Khatauli, Baghra and Chartawal contain extensive stretches of good and fertile tracts. For instance land between Kirsani and East Yamuna canal in Kandhla is exceptionally good; the soil of the central tableland in Khatauli is a loam of excellent quality; with the exception of small stretch of sandy tract in the south of pargana Chartawal the soil in the northern part is good loam with a considerable mixture of clay; and the uplands of Kairana are good fertile plains of rich soil. This relatively high prosperity was most probably the main cause of relatively high percentage of increase in the population of these parganas.

Muzaffarnagar and Shamli registered very high and high increase respectively. The very high increase in Muzaffarnagar pargana was mainly due t the urban attraction of the district headquarters. Shamli's case was also very much similar to that of Muzaffarnagar. From soil and prosperity considerations Shamli is not different from Kandhla- its immediate southern neighbour and as such may not be expected to increase its population by any thing more than the Upper Doab average. The pargana, however, recorded an increase of 58.4

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2. District Gazetteer of Muzaffarnagar, 1903, pp.221 - 307.

per cent in 1951. The only plausible explanation of this increase seems to be the presence of the Shamli town which is one of the three municipal towns of the district. The town, though of the fourth class, has swelled in population enormously during the ~~forties and fifties~~ *thirties and forties*. The population of the town increased in 1951 by 140.8 per cent and 44.8 per cent of its population in 1901 and 1941 respectively. The sudden swelling of population at and from the census year of 1941 may be appreciated by the comparison of intercensal and accumulated increase from 1901 set out in table XXXV. Shamli alone was responsible for an extra increase of more than 10 per cent because if the increase in Shamli would have been proportionately normal (or also if the population of Shamli be neglected in both the censuses) the increase in the pargana population would have worked to 48.1 per cent.

TABLE XXXV
INTERCENSAL AND ACCUMULATED ABSOLUTE AND PERCENTAL INCREASE IN THE POPULATION OF SHAMLI TOWN FROM 1901 to 1951

Town	I N T E R C E N S A L V A R I A T I O N								+ Increase - Decrease	
	1901 — 1911		1911 — 1921		1921 — 1931		1931 — 1941		1941—195	
	Absolute	Per cent	Absolu-te	Per cent	Absolute	Per cent	Absolu-te	Per cent	Absolu-te	Pe: cen
1	2	3	4	5	6	7	8	9	10	11
SHAMLI	-166	-2.2	+1113	+15.2	+515	+6.1	+3476	+38.8	+5570	+44

	A C C U M U L A T E D V A R I A T I O N								+Increase -Decrease	
	1901 — 1911		1901 — 1921		1901 — 1931		1901 — 1941		1901 — 1951	
	Abso-lute	Per cent	Abso lute	Per cent	Abso lute	Per cent	Abso lute	Per cent	Abso lute	Per cent
SHAMLI	-166	-2.2	+947	+ 12.6	+1462	+19.5	4038	+54.0	+10508	+140.8

SOURCE : Adapted from Census of India, 1951, District Census Handbook Uttar Pradesh, Muzaffarnagar District, Table A-IV. p.6

The pargana Bidauli is the worst in the district. It was the only pargana in the whole of Upper Doab which still suffered from a deficit on 1901 population. The whole pargana is badly vulnerable to annual inundations from Yamuna, Khokri and Sendhli rivers. The soil is greatly reh infected especially near the Yamuna river. On the whole, therefore, the pargana, with the possible exception of the eastern villages, is highly insecure, reh and sand infected and precarious. This seems to be the possible main cause of a constant decrease in population during the fifty years of the present century.

MEERUT DISTRICT

With the exception of the eastern and western parganas bordering on the Ganga and Yamuna rivers the rest of the parganas of the district had an increase above the Upper Doab average. The pargana of Hastinapur and Kithore on the east and of Chhaprauli, Kotani and Baghpat on the west recorded an increase between 30 and 40 per cent. The possible reason of this relatively low increase has already been pointed out. But in 1951 things seem to have changed. The urban pulls appear to have become more potent than the soil precariousness, reh and sand infections and vulnerability to floods. The marginal parganas did not have sizeable towns; and those that were there did not grow to noticeable volumes. Mawana - the tahsil headquarters and a municipality in the pargana of Hastinapur - was the only town which increased its population from 9,207 in 1901 to 15,663 in 1951 gaining by 6,456 persons or by over 70 per cent. Otherwise the remaining towns either had only nominal increase or did actually decline in population. Phalauda (pargana Hastinapur) had only an increase of about 11.3 per cent (591 persons) whereas P[illegible]chhatgarh in Kothore

pargana suffered a loss of about 9.5 per cent (604 persons). Similarly the parganas Chhaprauli with its rich black soil and Kotana with its rich black loam were edaphically well placed to have increased their population considerably, but could not keep pace with the rate of increase in other parganas due to absence of sizeable and growing towns. Table XXXVI gives comparative position of a few parganas in respect of the growth of town population and the percentage of increase in total population during 1901-51. It will be seen from the table that the percentage of variation in total population directly increased with the percentage of variation in the population of towns. Pargana Loni presented the most striking case in this regard. On the basis of soil and security conditions the Loni pargana is the worst in the

TABLE XXXVI

GROWTH OF URBAN AND TOTAL POPULATION IN SOME SELECTED PARGANAS DURING 50 YEARS, 1901-1951

Pargana	Total population in towns in 1901	Total population in the same* towns in 1951	Growth in town population		Percental variation in the total population of the pargana
			Total	Percent	
1	2	3	4	5	6
Meerut	125999	245179	119180	94.6	41.8
Hapur	25412	55412	30403	119.6	62.3
Baraut	7703	16928	9225	119.7	60.06
Chhaprauli	7058	7832	774	10.9	30.09
Hastinapur	14421	24870	7047	48.8	40.00
Loni	11275	43745	32470	288.0	64. 6

* In these calculations those towns are not included which were recognized only in 1951 and were not reckoned as towns in 1901.

S O U R C E : Adapted from Census of India, 1951, District Census Handbook of Meerut, Table, A-IV, pp.6-8.

district. It is infact the opposite number of the Bidauli pargana of Muzaffarnagar district and accordingly any appreciable increase in the population of this pargana was most unexpected. The pargana, however, recorded the highest increase of 64.6 per cent in the district and the third highest in Upper Doab being surpassed by Jwalapur and Muzaffarnagar parganas with 70.5 and 66.9 per cent respectively. The pargana contains the important town of Ghaziabad which has made phenomenal development in the field of industrial expansion under the direct influence of the fast expanding city of Delhi. The population of Ghaziabad increased by the astounding figure of 288.0 per cent of its 1901 population and of over 132 per cent of that of 1931. According to 1951 census Ghaziabad had 45.6 per cent of its population from outside the district of enumeration. More than half of this emmigrant population was accounted for by refugees from West Pakistan.

The situation in Hapur pargana provides a further confirmation of this close relation between the growth of towns and the increase in the total population of parganas. That the high percental variation of 62.3 in the tahsil was mainly due to the very high percentage of growth (119.6 p.c.) in the population of the towns of Hapur pargana is further emphasized when the total variation in the pargana is compared with the variation in the rural population during the same period. The rural population of Hapur pargana increased by 38.5 per cent against the increase of 62.3 per cent in the total population. This excess of about 24 per cent was therefore mainly due to the abnormal increase of 119.6 per cent in the population of towns.

In the middle of the district there was a belt of near-average increase comprising the parganas Meerut, Sarawa and Dasna. Topographic and edaphic

conditions in the latter two parganas do not seem to favour very high increase The pargana Dasna is traversed by two marked depressions with large uncultivable areas on either side of the Ganga canal. The soil is firm clay and usually becomes unworkable when dry. The most notable physical feature of the Sarawa pargana is the presence of numerous small streams which run in a north-west south-east direction. Sandy ridges run all along these streams and lateral spurs of bhur extend in every direction from these ridges giving great variety to the character of the soil. These bhur ridges run in broken lines from north to south. The large bhur areas are found in the eastern portion of the pargana where the soil is very poor in quality. Under these circumstances a higher increase was not to be expected and keeping the fact in view that these parganas did not contain sizeable towns, the percental increase of 46.5 and 43.3 in Sarawa and Dasna respectively were understandably in conformity with the general trend of variation and the character of the local situations. An unexpectedly low increase of 41.8 per cent in the Meerut pargana[3] calls for special attention. Edaphically it is one of the best parganas of the district. Though it contains some lines of ravines and broken lands in the Hindon khadir, but they are narrow and much restricted. Beyond the khadir the area is an upland plain of 'first class soil' covering more than half of the pargana. Only the extreme north-eastern section (of the 1901-1911 extent of the pargana) may be classed as very poor: but that portion now constitutes the pargana Daurala

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3. Meerut tahsil is not divided into parganas. It is, therefore, referred to as tahsil or pargana according as the description is tahsil or pargana-wise.

in the Sardhana tahsil. Besides good soil and terrain, the pargana has the advantage of good irrigation and communication facilities, central location and of having both the district and the division headquarters. Under these conditions it seems very strange that the pargana should have only an average increase of 41.8 per cent. This paradox could be resolved only if it be remembered that the area constituting the present pargana of Daurala was a part of Meerut pargana upto 1911 so that its population was included in that of Meerut pargana. It was in 1921 that this area was constituted into a separate pargana and was made a part of the tahsil of Sardhana. Thus the 1901 population of Meerut pargana included the then population of the present Daurala whereas the 1951 population was exclusive of it. This, therefore, caused the numerator to decrease and the denominator to increase at least by as much as the 1901 population of Daurala and thus resulted in the reduction of increase percentage for 50 years on the 1901 population.

On a retroprojection basis the 1901 population of Daurala may be taken to have been something like 67918. If this number is taken off, the 1901 population of Meerut becomes 274,225 and the net variation in 50 years works to a total of 21,1010 persons which gives a percental increase of 76.98. It may, therefore, be noted that 41.8 per cent is not the true index of increase in the pargana. The percental value is, rather unavoidably, vitiated by substantial change in the extent of Meerut otherwise this pargana registered the highest increase in the whole of the Upper Doab.[4]

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4. No absolute figure of increase can possibly be given as no separate enumeration for Daurala was made in 1901 census. The figure 76,98 is based on projected estimate and may, therefore, have a margin of error.

The tahsil of Sardhana taken as a whole registered the highest increase (69.0 per cent) in the Upper Doab during the fifty years (Fig. 23). The high increase is, however, fallacious as the tahsil did not include the presen pargana of Daurala in 1901. The percental increase, calculated on the base of 1901 population, is bound to be abnormally high because the numerator in this case contained the population of three parganas (namely Barnawa, Sardhana and Daurala). This fallacious impression of very high increase may be obliterated when the pargana-wise percentages of variation are examined. It may be noted from table XXXVII and Fig. 24 that the percental increase in the two parganas of Barnawa and Sardhana constituting the original tahsil of Sardhana was appreciably below the Upper Doab average being 23.6 and 22.0 per cent respectively. This relatively low increase in the original tahsil seems attributable to the absence of towns of any importance and to the close vicinity of the fast expanding divisional headquarters of Meerut. Though further dilation upon the relative growth of the rural and urban populations would be made in a latter chapter it may, however, be noted here that Sardhana was one of the few tahsils in which the urban population suffered a loss relative to 1901 total. Sardhana suffered a loss of almost 2 per cent in its urban population despite the inclusion of the town of Daurala after 1911. In 1901 its urban population was 9.73 per cent but in 1951 it decreased to 7.83 per cent. The rural population, on the other hand, did not register very sizeable increase. The gain in the rural component was also about 2 per cent : the rural population increased from 90.27 per cent in 1901 to 92.11 per cent in 1951.

TABLE XXXVII

INTERCENSAL POPULATION VARIATION BY PARGANAS,
DISTRICT MEERUT, 1901-1951

Pargana	Population		Variation	
	1951	1901	Absolute	Percent
1	2	3	4	5
Baghpat	176,295	130,011	46,284	35.6
Baraut	108,898	68,035	40,863	60.1
Kotana	72,612	53,715	18,897	35.2
Chhaprauli	59,512	45,745	13,767	30.1
Tahsil Baghpat	417,317	297,606	119,811	40.3
Jalalabad	193,314	124,667	68,647	55.1
Loni	109,502	66,495	43,007	64.6
Dasna	122,371	85,356	37,015	43.3
Tahsil Ghaziabad	425,187	276,518	148,669	57.4
Garhmukhteswar	86,271	58,742	27,529	46.8
Hapur	180,150	110,994	69,156	62.3
Sarawa	61,148	41,742	19,406	46.5
Path	43,285	31,990	11,295	35.3
Tahsil Hapur	370,854	243,468	127,386	52.3
Hastinapur	141,634	101,165	40,469	40.0
Kothor	136,529	99,234	37,295	37.5
Tahsil Mawana	278,163	200,399	77,764	38.8
Meerut	485,235	342,143	143,092	41.8
Tahsil Meerut	485,235	342,143	143,092	41.8
Barnawa	99,658	80,610	19,048	23.6
Sardhana	121,467	99,531	21,936	22.0
Daurala	83,336	...	...	...
Tahsil Sardhana	304,461	180,141	124,320	69.0

SOURCE : District Gazetteer of Meerut and Census of India 1951, U.P., District Census Handbook of Meerut.

BULANDSHAHR DISTRICT

On the whole the increase in the population of the district was con-siderably below the Upper Doab average and slightly less than the average increase in the State. The total gain in the population of the district during the first fifty years of the century was 361,783 persons. This amounts to an increase of about 31.9 per cent relative to the 1901 population. It may, therefore, be seen that Bulandshahr district was very much on par with Saharanpur district which had an increase of about 29.4 per cent.

In respect of percental variation the district was clearly divided into three distinct sections. The eastern section comprising tahsils of Bulandshahr and Anupshahr had the highest increase in the district. The western and sothern sections comprising Khurja and Sikandarabad tahsils respectively occupied second and third place in respect of variation percentage. Anupshahr tahsil alone, with an increase of 39.0 per cent, had a thin edge over the Upper Doab average otherwise the rest of the tahsils including Bulandshahr were below that average.

A pargana-wise distribution of variation, however, presents a more detailed pattern of spatial arrangement. It will be seen from Fig.24 that in all the western parganas namely Dankaur, Jewar, Sikandarabad and Dadri the increase percentage was low. Pargana Dankaur had the lowest increase not only in the district but in the whole of the Upper Doab (table XXXVIII). This pargana is one of the most precarious parts of the district. About half of the pargana is composed of Yamuna khadir which varies from 3 to 8 miles in width. The khadir is inferior and contains a great deal of sand and unculturable waste. Beyond the Bhuriya Nadi as far as the high ridge

TABLE XXXVIII

INTERCENSAL POPULATION VARIATION BY PARGANAS,
DISTRICT BULANDSHAHR, 1901-1951

Pargana	Population		Variation	
	1951	1901	Absolute	Percent
1	2	3	4	5
Ahar	119,475	86,437	33,055	38.2
Anupshahr	115,410	83,316	32,111	38.5
Dibai	151,861	108,399	43,479	40.1
Tahsil Anupshahr	386,746	278,152	108,594	39.1
Agota	104,520	79,010	25,510	32.3
Shikarpur	70,084	52,792	17,292	32.7
Baran	157,333	111,469	45,873	41.1
Siana	123,764	88,991	34,803	39.1
Tahsil Bulandshahr	455,701	332,262	123,439	37.2
Pahasu	97,391	78,820	18,571	23.5
Khurja	155,469	118,916	36,553	30.7
Jewar	87,339	69,102	18,237	26.4
Tahsil Khurja	340,199	266,838	73,361	27.5
Dadri	129,216	99,520	29,696	30.0
Dankaur	61,612	60,016	1,596	2.6
Sikandarabad	126,410	101,313	25,097	24.7
Tahsil Sikandarabad	317,238	260,849	56,389	21.6

SOURCE : District Gazetteer of Bulandshahr and Census of India 1951, U.P., District Census Handbook of Bulandshahr.

separating the khadir from the uplands, the soil is infertile. The belt along the high bank is replete with salt marshes and saline wastes. Besides, the whole of the khadir is vulnerable to floods and the whole tract is rather unhealthy.[5] Moreover, the pargana does not contain towns of any size. According to 1951 census there were only two towns namely Dankaur and Bilaspur with a population of 4,500 and 2,471 persons respectively. That these towns had no urban pull is evident both from their size and from the fact that their population has steadily declined from 1901 as is brought out by table XXXIX. Most probably the absence of towns and vitality for the growth of urban centres is a reflex of the agricultural precariousness of the pargana. These circumstances seem to account for the abnormally low percentage increase of 2.6 in fifty years.

TABLE XXXIX

VARIATION IN THE POPULATION OF THE TOWNS OF DANKAUR PARGANA, 1901-1951

Town	Population					
	1901	1911	1921	1931	1941	1951
1	2	3	4	5	6	7
Dankaur	5444	5340	5177	4839	5289	4500
Bilaspur	3345	3101	2679	3034	2990	2471

SOURCE : Census of India 1951, U.P., District Census Handbook of Bulandshahr, Table A-V. p.9.

5. District Gazetteer of Bulandshahr, 1922, pp.222-224

The situation in other parganas of the western section was not much different from that in the Dankaur pargana, discussed above.

Dadri is slightly less precarious and contains in the southern part a tract of exceptionally rich clay between the sandy ridge (separating the watersheds of Karwan and Patwaha Bahu) and the high bank of the Patwaha (Figs. 3 & 6). The extreme eastern part, lying on the east of the ridge, also contains a tract of very good loamy soil with a very high standard of cultivation.[6] On the whole, therefore, Dadri pargana is agriculturally superior to Dankaur. The urban position, however, is almost identical. According to 1951 census the pargana had only one town of Dadri with a population of 6,668 persons.

Sikandarabad pargana is also rather inferior to Dadri and almost similar to Dankaur in respect of agricultural prosperousness. Along the Dankaur boundary the soil is poor, sandy and uneven. Similarly on the eastern side of the Karwan there are several usar tracts. It is only in the north-western section of the pargana along the Dadri border that there is a stretch of excellent soil.[7] Sikandarabad is, therefore, an agriculturally precarious pargana and the increase would have probably been lesser than 24.7 per cent had it not contained the historic town of Sikandarabad which is a flourishing urban centre with a population of 24,080 in 1951 against 18,290 in 1901.[8] The other town of the pargana is Kakore but it is an insignificant town with a

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6. District Gazetteer of Bulandshahr, 1922, pp. 216-217.
7. ibid. pp. 300-301.
8. Decinnial variation in Sikandarabad town were as follows:

1901	---	18,290
1911	---	18,946
1921	---	16,857
1931	---	18,974
1941	---	23,307
1951	---	24,080

(District Census Handbook of Bulandshahr 1951, p.6.)

capricious record of population variation. It had a population of 2,402 in 1951 against 3,152 in 1901.

As has been discussed earlier the Jewar pargana of Khurja tahsil is also a precarious area and with the exception of Rabupura contains no town. Rabupura, too, is a very small town of 5,530 persons according to 1951 census

It may, therefore, be noted that the whole western section of the district is generally inferior in agricultural resources and is devoid of sizeable towns. These two conditions, and especially the former, seem to be mainly responsible for a low increase in the population of this section.

The eastern parganas had a relatively high increase bordering on the Upper Doab average of 38.16 per cent. These parganas form a close girdle around the Baran pargana (the sadar pargana containing the district town of Bulandshahr) which along with Dibai pargana recorded an increase of slightly more than 40 per cent (Fig.24). This belt of average increase comprised the parganas of Agota (32.2 per cent), Siana (39.1 per cent), Ahar (38.2 per cent), Shikarpur (32.7 per cent), and Khurja (30.7 per cent). Agriculturally these parganas are fairly prosperous with good productive soil and adequate water supply. With the exception of a narrow belt of the Ganga khadir in the extreme east and of the Kali Nadi, Nim Nadi and the Chhoiya Nadi, the land is generally level plain of good productive soil. Agota pargana though was badly hit by the use of Kali Nadi as an escape by the canal department in the early years of this century, has now considerably recovered by the straightening and deepening of the Kali andby almost stopp-ing its use as an escape ~~from~~ for the canal by the irrigation department. The pargana is now classed as one of the best lands in the district.

Siana has three distinct belts of longitudinal arrangement. The western belt adjoining the Agota border contains good firm loamy soil of fair production. The central section is, however, inferior and most of it consists of poor and light soils. But the eastern part between the Nim Nadi and the Ganga khadir is again a tract of firm good loam.

The eastern half of the Ahar is relatively poor with light and sandy soils. It is only here and there that some villages of fairly good soil are met with. But the land on the west of the Nim Nadi is a level plain of good loam with a firm subsoil that highly favours well irrigation. On the whole the pargana may reasonably be considered as fairly prosperous.

In the Anupshahr pargana, as in its northern neighbour the Ahar, the Ganga banks are high, the river flows close to high cliff and the khadir is therefore very limited. Between the Anupshahr Branch of Ganga Canal and the Nim Nadi the land is of excellent quality. On the west of the Nim Nadi too the country is a fairly level plain of good soil. It is only on the east of the canal that the land deteriorates and the soil grows lighter as it approaches the high banks of the Ganga where it is poor and sandy and is either cut up by ravines or is intersected by sand hills or ridges.

Shikarpur is a firly level pargana of light loamy soil. The level landscape is broken only by two narrow lines of sandy bhur running in the north-south direction near the eastern and western borders of the pargana. There is only one narrow belt of usar lands which runs along the jhil(i.e.,fen strewn tract near the chhoiya Nadi.

Khurja, the last pargana of the belt, is relatively precarious. Throughout the pargana there are extensive tracts of barren usar land. In the north of the pargana there is a stretch of poor sandy soil which extends from

the Sikandarabad and Baran borders upto the town of Khurja. Similarly the extreme western section of the pargana is also highly precarious because of the khadir and the capricious character of the Karwan Nadi.[9]

It may therefore be noted that the whole of the girdling belt save the pargana of Khurja is agriculturally well placed and fairly prosperous. However, the parganas with the exception of the Khurja pargana are rather conspicuous for absence of towns of any notable size. These two factors seem to have counter balanced the effects of each other. From table XL it will be seen that with the exception of Khurja and to some extent of Jahangirabad, Shikarpur and Siana none of the towns were of any effective size. The latter three, in any case, were not flourishing towns of steadily increasing population. The urban factor, therefore, was possibly effective only in the growth of the population of Khurja pargana which in view of its less favourable agricultural situation would, in all probability, have recorded a lesser increase than 30.7 per cent which it actually did during 1901-51.

The highest increase in the district was recorded only in two parganas: the Baran and the Dibai. But the increase was only slightly above the Upper Doab average and was much below the increase in many parganas of Meerut and Muzaffarnagar districts. Baran with 41.1 per cent was the top pargana while Dibai was a close second with 40.1 per cent.

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9. District Gazetteer of Bulandshahr, 1922, pp.243-276.

TABLE XL

POPULATION VARIATION IN TOWNS OF THE BELT OF AVERAGE INCREASE IN BULANDSHAHR DISTRICT, 1901-1951

Town	Pargana	Population					
		1901	1911	1921	1931	1941	1951
1	2	3	4	5	6	7	8
Khurja	Khurja	29,277	27,387	25,719	31,279	35,376	38,462
Jahangirabad	Anupshahr	11,572	11,218	10,279	10,745	12,922	14,679
Shikarpur	Shikarpur	12,249	10,278	9,795	10,655	11,783	11,475
Siana	Siana	7,615	8,274	7,485	7,647	10,882	10,105
Anupshahr	Anupshahr	8,601	6,419	6,872	7,499	8,315	9,358
Gulaothi	Agota	7,208	6,027	5,692	6,527	7,901	9,862

S O U R C E : Census of India 1951, U.P., District Census Handbook of Bulandshahr, pp. 6-8.

Baran Pargana is agriculturally poorer than Dibai pargana. The soil in Baran is for the most part loam of a moderate quality on the west of the Kali Nadi and of a rather inferior quality on the eastern side of the stream where it is diversified by occasional sandy patches.[10] The relatively high percental increase was, therefore, mainly due to the presence of the district headquarters of Bulandshahr. The town of Bulandshahr, though of much smaller magnitude in the earlier decades, began to swell rapidly from the later twenties. The towns population increased by 97.7 per cent against an increase of 31.7 per cent in

10. District Gazetteer of Bulandshahr, 1922, pp.194-195

the rural population of the pargana relative to 1901 figures. It, therefore, seems quite clear that the high increase percentage in Baran was chiefly due to the town of Bulandshahr.

Dibai is a relatively prosperous pargana and contains considerable extent of fairly good quality soil. Even upto the close vicinity of the Ganga River there are considerable areas of rich fertile soil.[11] The pargana is highly rural in character and save Dibai contains no town whatsoever. The town of Dibai, too, is quite small with rather a static population. It's population increased to 12,610 in 1951 from 10,579 in 1901 amounting to 19.2 per cent which is quite insignificant compared to the percental increase of 42.4 in the rural population of the pargana. The relatively high increase of 40.1 per cent in the pargana was mainly in the rural population and was chiefly due to the agricultural prosperity of the area.

MEAN DECENNIAL GROWTH RATES

Before concluding the survey of the dynamism of numbers during the fifty years of the century it seems desirable to discuss briefly the decennial variation during the fourth and fifth decades as a logical complement to a similar discussion made at the end of the study of the second phase of the variation of numbers. Table XLI sets out the absolute and percental variations by tahsils for the decade 1931-41 and 1941-51 and the Figs. 17 and 18 bring out the regional pattern of the variation during these two decades. From the table it may be noted that the acceleration that was generated in the population growth during the decade 1921-31 was further accentuated

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11. District Gazetteer of Bulandshahr, 1922, p.230.

TABLE XLI
TAHSIL-WISE PERCENTAL VARIATION AND MEAN DECENNIAL GROWTH-RATE FOR TWO DECADES - 1931-41 & 1941-51

Tahsil & District	Population Variation 1931-1941			Population Variation 1941-1951		
	Absolute	Percent	Mean decennial growth-rate	Absolute	Per cent	Mean decennial growth-rate
1	2	3	4	5	6	7
Deoband	+ 16,523	7.5	7.20	+ 29,227	12.3	11.58
Nakur	+ 25,516	13.4	13.03	+ 19,361	9.3	8.87
Roorkee	+ 47,391	15,3	14.23	+ 54,251	15.2	14.14
Saharanpur	+ 47,116	14.3	13.30	+ 70,331	18.6	17.03
DISTRICT	+136.546	13.08	12.27	+ 173.170	14.67	13.66
Budhana	+ 34,980	17.8	16.35	+ 33,608	14.5	13.54
Jansath	+ 31,725	15.2	14.15	+ 40,209	16.7	15.45
Kairana	+ 44,391	19.7	17.9	+ 43,627	16.2	14.94
Muzaffarnagar	+ 51,001	19.3	17.6	+ 47,565	15.1	14.03
DISTRICT	+162.097	18.1	16.6	+ 165.009	15.6	14.48
Baghpat	+ 59,676	16.0	17.77	+ 55,517	15.3	14,25
Ghaziabad	+ 58,580	20.9	18.96	+ 86,969	25.7	22.78
Hapur	+ 47,333	17.9	16.45	+ 59,434	19.1	17.42
Meerut	+ 64,463	20.2	18.33	+ 101,411	26.4	23.33
Mawana	+ 34,748	17.4	16.04	+ 44,178	18.9	17.25
Sardhana	+ 39,652	17.4	16.02	+ 37,126	13.9	12.98
DISTRICT	+294.664	18.4	16.80	+ 384.635	20.17	18.4
Anupshahr	+ 51,338	17.8	16.35	+ 47,079	13.9	12.76
Bulandshahr	+ 50,730	14.8	13.8	+ 62,761	16.0	14.79
Khurja	+ 43,920	17.0	15.66	+ 37,818	12.5	11.77
Sikandarabad	+ 34,350	13.9	12.96	+ 33,003	12.4	11.67
DISTRICT	+183.338	16.1	14. 5	+ 179.661	13.6	12.74
Upper Doab	+776.645	16.6	15.33	+ 902.475	16.54	15.28
U.P.	+755.094	13.0	12.07	+6683.894	11.08	11.16

SOURCE : Adapted from figures given in Census of India, U.P. 1931, 1941 &1951, Imperial and Provincial Tables.

during the years 1931-41.

The rapidity with which the population grew in Upper Doab during the decade may be guaged from the fact that the mean decennial growth-rate in the region was noticeably above the State average of 12.7 per cent.[12] As indicated by table XLI and Fig.25 all the districts of Upper Doab except Saharanpur multiplied their population at considerably higher rate than the State normal. Saharanpur's mean rate of growth was only 0.43 per cent short of the State average though it was as much as 3.06 percent below the average for the Upper Doab. Meerut district had the highest rate of 16.84 per cent with Muzaffarnagar district being a close second with the mean rate of 16.6 per cent.

Tahsil-wise figures present even a sharper contrast with the State average. From table XLI it will be noted that seventeen of the eighteen tahsils and a growth-rate above the State average. Deoband tahsil was the lonely exception. On the other hand Fig.26 shows that five tahsils out of six in Meerut district and three tahsils out of four in Muzaffarnagar district were above the Upper Doab average. In Bulandshahr district two tahsils each were above and below the average while in Saharanpur district there was none above this average. Another point that may be noted is that very high growth-rates were recorded in those tahsils which had a sizeable and growing urban centre. Ghaziabad, for instance, had the highest rate of growth (18.96) and was closely followed by Meerut with 18.33 per cent with Kairana and Muzaffarnagar coming next in descending order with 17.9 and 17.6 per cent respectively.

This increase was mainly a natural growth. The death-rate during the fourth decade was lower compared with that of the previous decade whereas

12. Rajeshwari Prasad, Census Superintendent, notes in his report on 1951 census that " the growth accelerated considerably to a record mean decennial rate of 12.7 per cent in 19 years, a rate never attained before in the known demographic history of the state Uttar Pradesh." Census of India 1951, Vol.II, Uttar Pradesh Part I-A Report, p.30.

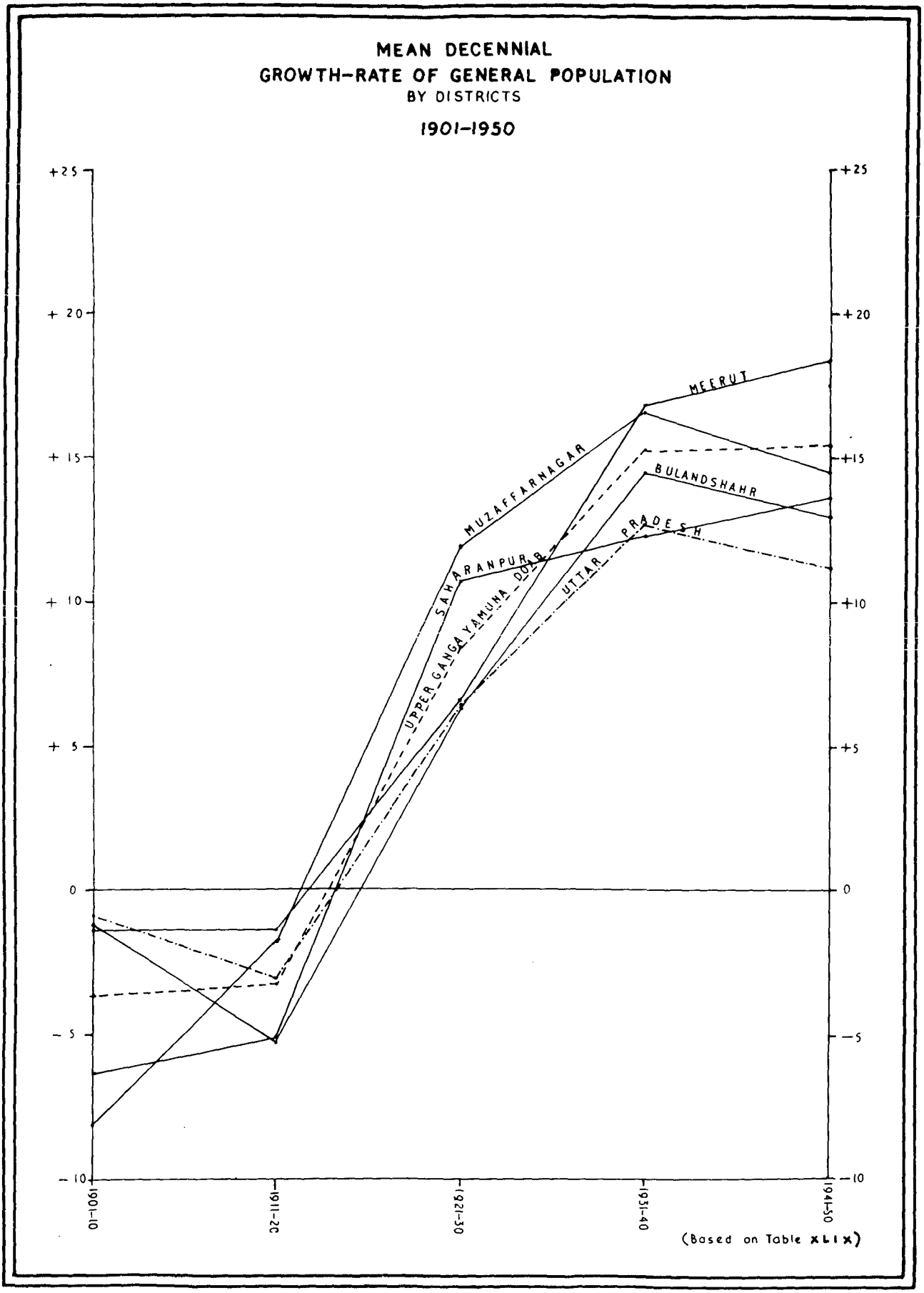
MEAN DECENNIAL
GROWTH-RATE OF GENERAL POPULATION
BY DISTRICTS
1901-1950
+25
+20
+15
+10
+5
0
-5
-10
MEERUT
MUZAFFARNAGAR
BULANDSHAHR
SAHARANPUR
UPPER GANGA YAMUNA DOAB
UTTAR PRADESH
1901-10
1911-20
1921-30
1931-40
1941-50
(Based on Table XLIX)

FIG. 25

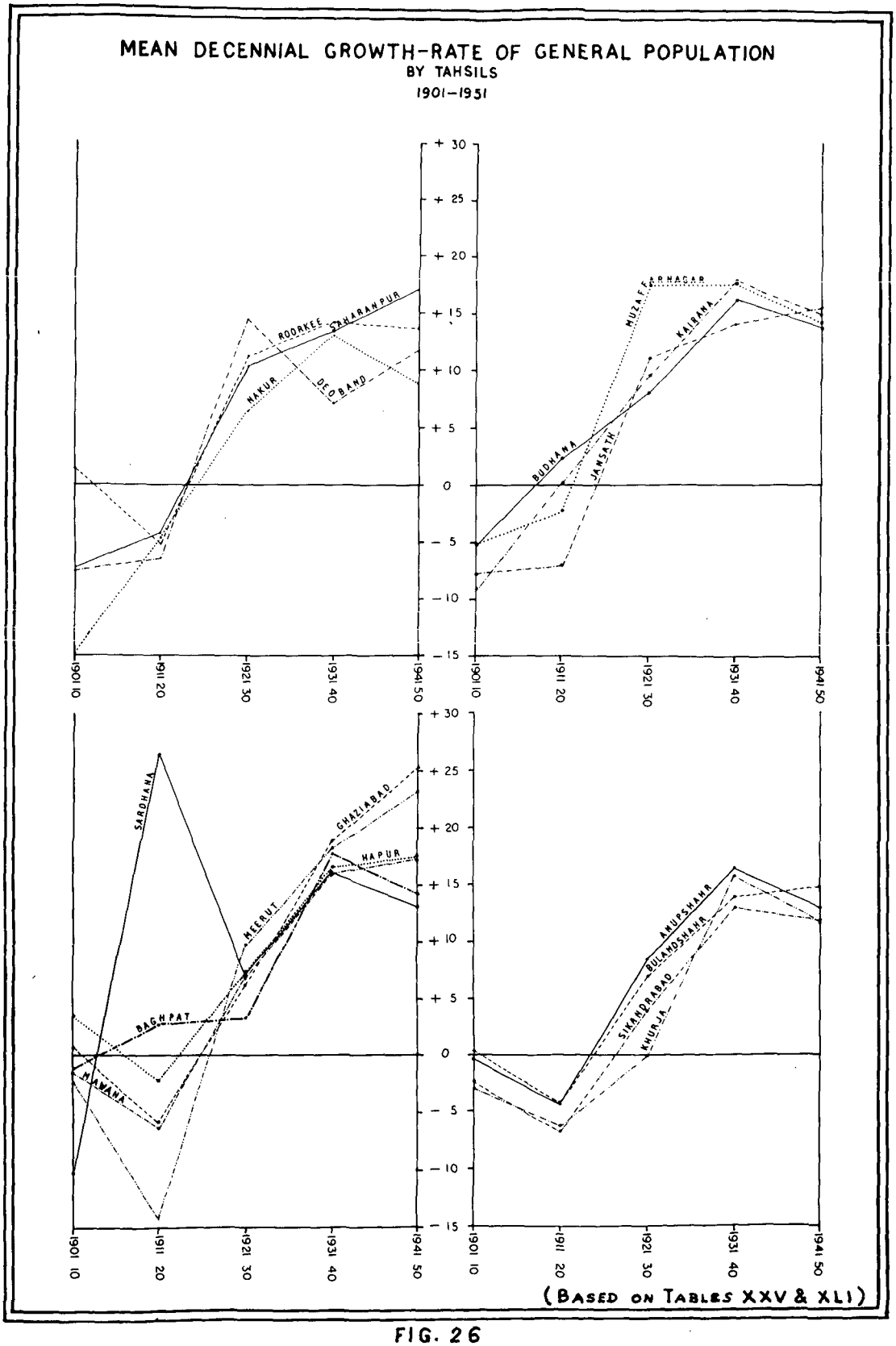
MEAN DECENNIAL GROWTH-RATE OF GENERAL POPULATION
BY TAHSILS
1901–1951
+ 30
+ 25
+ 20
+ 15
+ 10
+ 5
0
– 5
– 10
– 15
1901 10
1911 20
1921 30
1931 40
1941 50
ROORKEE
SAHARANPUR
MAKUR
DEOBAND
MUZAFFARNAGAR
KAIRANA
BUDHANA
JANSATH
SARDHANA
GHAZIABAD
HAPUR
MEERUT
BAGHPAT
HASANA
ANUPSHAHR
BULANDSHAHR
SIKANDRABAD
KHURJA
(BASED ON TABLES XXV & XLI)

FIG. 26

the birth-rates were higher in certain districts and lower in others thus the natality remained rather stationary showing only a slight rise. Table XLII sets out the birth and death-rates during the 1921-30 and 1931-40 decades. The low death-rates indicated better public health conditions. Infact the decade was almost free from epidemics and scarcity.

TABLE XLII

MEAN DECENNIAL VITAL STATISTICS BY DISTRICTS FOR THE DECADES 1921-30 and 1931-40

District	Mean decennial birth-rate		Mean decennial death-rate		Mean decennial rate of natural increase		Mean decennial growth-rate	
	1921-30	1931-40	1921-30	1931-40	1921-30	1931-40	1921-30	1931-40
1	2	3	4	5	6	7	8	9
	%	%	%	%	%	%	%	%
Saharanpur	41.0	39.6	30.5	29.3	10.5	10.3	10.7	12.2
Muzaffarnagar	36.4	39.5	23.2	22.2	13.2	17.3	11.9	16.6
Meerut	38.8	38.0	27.2	21.9	11.6	16.1	6.7	16.8
Bulandshahr	40.9	42.9	30.9	26.6	10.0	16.3	6.4	14.7

S O U R C E : District Census Handbooks, Census of India, U.P., 1951.

That the immigration played a very insignificant role in the growth of population is clearly indicated by the comparison of columns 7 and 9 of the table. It will be seen that in districts Saharanpur and Meerut the growth-rate exceeded the natural increase only by 1.9 and 0.7 per cent respectively whereas in districts Muzaffarnagar and Bulandshahr the natural increase had

almost an equal (0.9 and 1.6 p.c. respectively) edge over the growth-rate. Thus if there was any immigration its effect was rather fully countered by an almost equal emigration.

Though the growth of population continued at quite a rapid rate in the fifth decade, the mean decennial growth-rate as indicated in table XLIII was relatively reduced to 15.28 per cent from 15.33 of the fourth decade. This reduction was however, not uniformly spread over the whole of the Upper Doab. On the district level Saharanpur and Meerut districts recorded an increase of 1.4 and 1.56 per cent respectively on their growth-rate during the previous decade. Muzaffarnagar and Bulandshahr districts reduced the rate by 2.1 and 2.16 per cent respectively relative to the previous decade indices. The tahsil-wise position is depicted in Fig.26. It will be noted from this Figure that nine tahsils had an edge over the previous rate and the remaining nine suffered a reduction. The aggregate quantum of gain and loss was such that the growth position in the whole territory remained rather stationary showing negligible reduction of only 0.05 per cent.

Table XLIII shows the mean decennial rates of births, deaths, natural increase and the net growth during 1941-50. The first notable point is a marked decline in the death-rate. This decline was shared by all the districts though of course with slight variations in amount. Saharanpur district had the maximum reduction with a drop from 29.3 to 21.7 per cent. Bulandshahr was a close second with a reduction of 6.6 per cent while Muzaffarnagar and Meerut recorded a drop of 6.2 and 5.0 per cent respectively.

The second noteworthy point is an unprecedented reduction in birth-rate also. The mean birth-rate dropped considerably below the previous decade level in all the districts. Muzaffarnagar had the highest reduction

of 10.9 per cent. The reduction in the remaining districts was also comparably sizeable. Bulandshahr had the second highest reduction of 9.8 per cent while Saharanpur and Meerut followed (rather closely) with 8.3 and 8.1 per cent respectively.

TABLE XLIII

MEAN DECENNIAL VITAL STATISTICS BY DISTRICTS FOR TWO DECADES 1931-40 and 1941-50

District	Mean decennial birth-rate		Mean decennial death-rate		Mean decennial rate of natural increase		Mean decennial growth-rate	
	1941-50	1931-40	1941-50	1931-40	1941-50	1931-40	1941-50	1931-40
1	2 %	3 %	4 %	5 %	6 %	7 %	8 %	9 %
Saharanpur	31.3	39.6	21.7	29.3	9.6	10.3	13.7	10.7
Muzaffarnagar	28.6	39.5	16.0	22.2	12.6	17.3	14.5	14.2
Meerut	29.9	38.0	16.9	21.9	13.0	16.1	18.4	14.9
Bulandshahr	33.1	42.9	20.0	26.6	13.1	16.3	13.0	13.4

S O U R C E : District Census Handbooks, Census of India, U.P..,1951.p.iv.

The relative positions of birth and death-rates emphasize a decline in the mean rate of natural increase - the third point that is notable from the table. It will be seen from the comparison of columns 6 and 8 of the table that the growth-rate was appreciably in excess of the rate of natural increase. This indicates an increase in the number of immigrants. In Saharanpur, for instance, the growth-rate exceeded the natural increase by

4.1 per cent in the 1941-50 decade. The growth-rate excess over the natural increase was, however, highest in Meerut district being 5.4 per cent. Muzaffarnagar was third in this respect with an excess of 1.9. Bulandshahr was a surprising exception as in this district the natural increase had a slight edge of 0.1 per cent over the growth-rate. The increased significance of migrations in the growth of numbers during the ~~fifties~~ forties is easily under--standable as the partition of the country into independent states of India and Pakistan, which took place in this decade, triggered mass migrations across the borders.

The regional distribution of various percentages of increase during the 10 years between 1941 and 1951 is shown in Fig.18. The whole Upper Doab appears to have been divided into zones of low, medium, high, and very high percental increase. One long belt, resembling a sign of interogation, of medium increase traversed the Upper Doab from Saharanpur tahsil through the tahsils of Roorkee, Muzaffarnagar, Budhana to Baghpat tahsil in Meerut. In the extreme south of the region there was a U-shaped belt of low increase. This belt comprises all but the sadar tahsil of Bulandshahr district. Another region of low increase was on the ~~eastern~~ western and southern side of Saharanpur district in the tahsil of Nakur and Deoband respectively. Meerut district was very much conspicuous for having both the high and very high increase regions. Meerut tahsil had the highest increase whereas the tahsils of Ghaziabad and Hapur, and Mawana stood respectively in the second and third place on the scale of increase. This pattern of increase compared with the regional patterns as depicted in the maps of earlier decades (Figs.14,15,16 and 17) indicates that slowly but steadily Meerut district continued to gain strength as a centre of gravity of the population of Upper Doab.

Another point worth noting is that the urban population gradually became a more decisive factor in the dynamism of the numbers during the two closing decades of the first 50 years of the present century. A detailed survey of the urban, rural variation will be made in the next chapter, it may, however, be noted from table XLIV that the mean natural increase of the urban population exceeded that of the rural population only during the decade 1941-50 and that too only in two districts, whereas the rate of growth of the urban population continued to exceed that of the rural population at a steady rate since the third decade of the century.

TABLE XLIV

MEAN DECENNIAL RATES OF NATURAL INCREASE AND GROWTH IN RURAL AND URBAN POPULATION OF DISTRICTS DURING THE THREE DECADES 1921-30, 31-40 & 41-50

District	Mean decennial natural increase						Mean decennial growth-rate					
	1921-30		1931-40		1941-50		1921-30		1931-40		1941-50	
	R	U	R	U	R	U	R	U	R	U	R	U
1	2	3	4	5	6	7	8	9	10	11	12	13
Saharanpur	12.2	3.4	11.4	6.0	9.8	9.0	9.8	14.8	8.8	24.7	10.7	23.2
Muzaffarnagar	14.7	5.2	18.0	13.6	11.9	16.0	11.0	17.0	14.9	25.9	14.2	16.0
Meerut	13.2	4.5	17.1	12.0	12.9	13.7	5.6	11.5	15.6	22.4	14.9	32.1
Bulandshahr	12.2	3.2	17.3	11.4	13.1	12.8	5.2	13.2	14.0	18.4	13.4	10.4

S O U R C E : District Census Handbooks, Census of India, U.P., 1951, p.iv.

The contrast between the rates of growth in urban and rural population is graphically shown in Fig 27(a&b) It was only in Meerut that the urban population continued increasing at an acceleratory rate while the urban population of the districts of Saharanpur, Muzaffarnagar and Bulandshahr formed a somewhat ~~sine~~ sigmoid curve attaining the apex in the thirties. A comparison with the average rate of growth of urban and rural population of the whole Upper Doab reveals another point worth noting. It will be seen from tables XLV and XLIV that both Saharanpur and Muzaffarnagar considerably exceeded the Upper Doab average of urban growth during the thirties while during the next decade Muzaffarnagar fell on the deficit while Saharanpur managed to maintain its excess but only with a negligible amount of 0.3 per cent. On the contrary Meerut, while trailing behind the average of the region during the thirties by 0.3 per cent shot considerably ahead of it in the forties recording a lead of no less than 9.2 per cent. Bulandshahr, however, continued to lose. Its urban population fell below the average by 12.5 per cent in the fifth decade while it was only 4.3 per cent short of the average in the fourth decade.

TABLE XLV

MEAN DECENNIAL URBAN RURAL POPULATION AND GROWTH-RATE IN UPPER DOAB DURING THE TWO DECADES 1931-40 1941-50

Region	Mean Population 1931-40		Growth-rate		Mean Population 1941-50		Growth rate	
	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
1	2	3	4	5	6	7	8	9
Upper Doab	4,153,977	910,231	13.4	22.7	4,758,933	1,144,834	13.5	22.9

S O U R C E : Calculations based on data from Census of India, U.P..,1931, 1941 and 1951.

MEAN DECENNIAL GROWTH-RATE
OF
RURAL & URBAN POPULATION
BY DISTRICTS

1901-1950

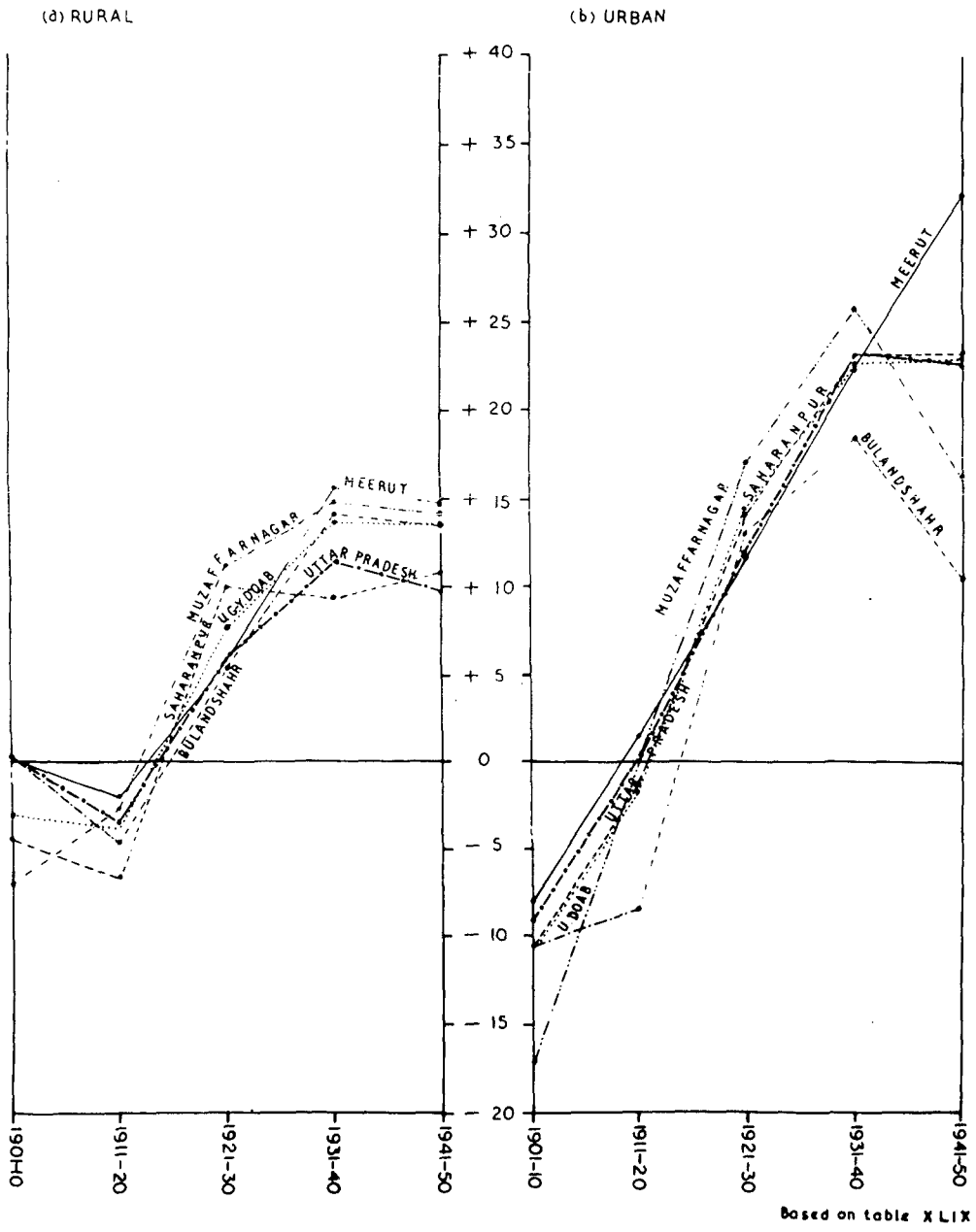

FIG. 27 (a & b)

CHAPTER VI

RURAL AND URBAN POPULATION

SECTION I

RURAL POPULATION

The general distribution of rural and urban[1] population in 1951 is shown in Fig.28. From the map it will be seen that the whole of Upper Doab was predominantly rural even in 1951. All through the five decades of the twentieth century the rural percentage has practically never fallen below 80. (Fig.29). From table XLVI it will be seen that the percentage of the rural population attained its maximum in 1911 and then tended to decrease first very slowly till it almost levelled with the 1901 percentage in 1931; thenceforth the decline became more substantial and by 1951 the rural percentage dropped to 79.9 or about 3 per cent below the 1901 figure. However, it will be seen from the comparison

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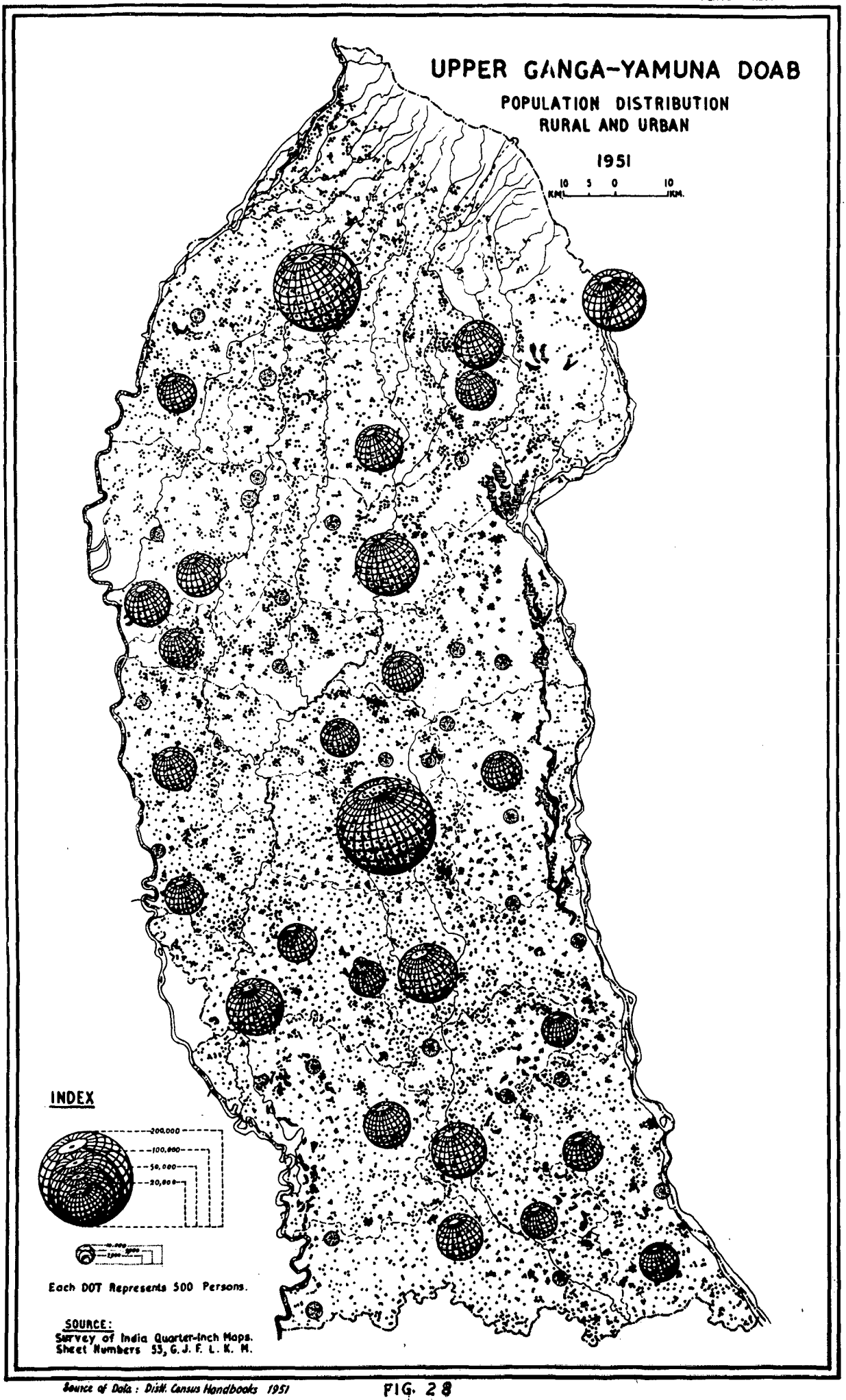
1. There is no universally accepted standard definition of the terms 'rural ' and'urban'. These terms not only refer to the magnitude of the concentration of human beings in a particular place but also connote certain social, cultural and vocational aspects of the life of the people or the nation. A standardization for universal use is, therefore, well-nigh impossible. The United Nations Commission on Population, realizing the difficulty in the formulation of standard methods of urban and rural classification, simply. refrained, in its fourth session in 1949, to define categorically the rural and urban components of population. The problem of formulating the definition or ' rural' and 'urban ' with finality is still as much unresolved as ever. The Indian Census 1951, however, adopted a definition according to which " an agglomeration having a continuous group of houses permanently inhabited by usually not less than 5,000 persons, is to be treated as 'town', or in other words an urban area, but,... we have also made certain exceptions to this establishmd minimum and have included some places of smaller size in the urban category if they have certain urban characteristics. On the other hand agglomerations of population over 5,000 have also been treated as rural if the urban characteristics are not present. In this classification our approach has been that all the agglomerations having local government or administration under a municipal, cantonment, notified area or town area committee are invariably treated as urban. Of the remaining centres of

PLATE XLVI



Source of Data : Distt. Census Handbooks 1951

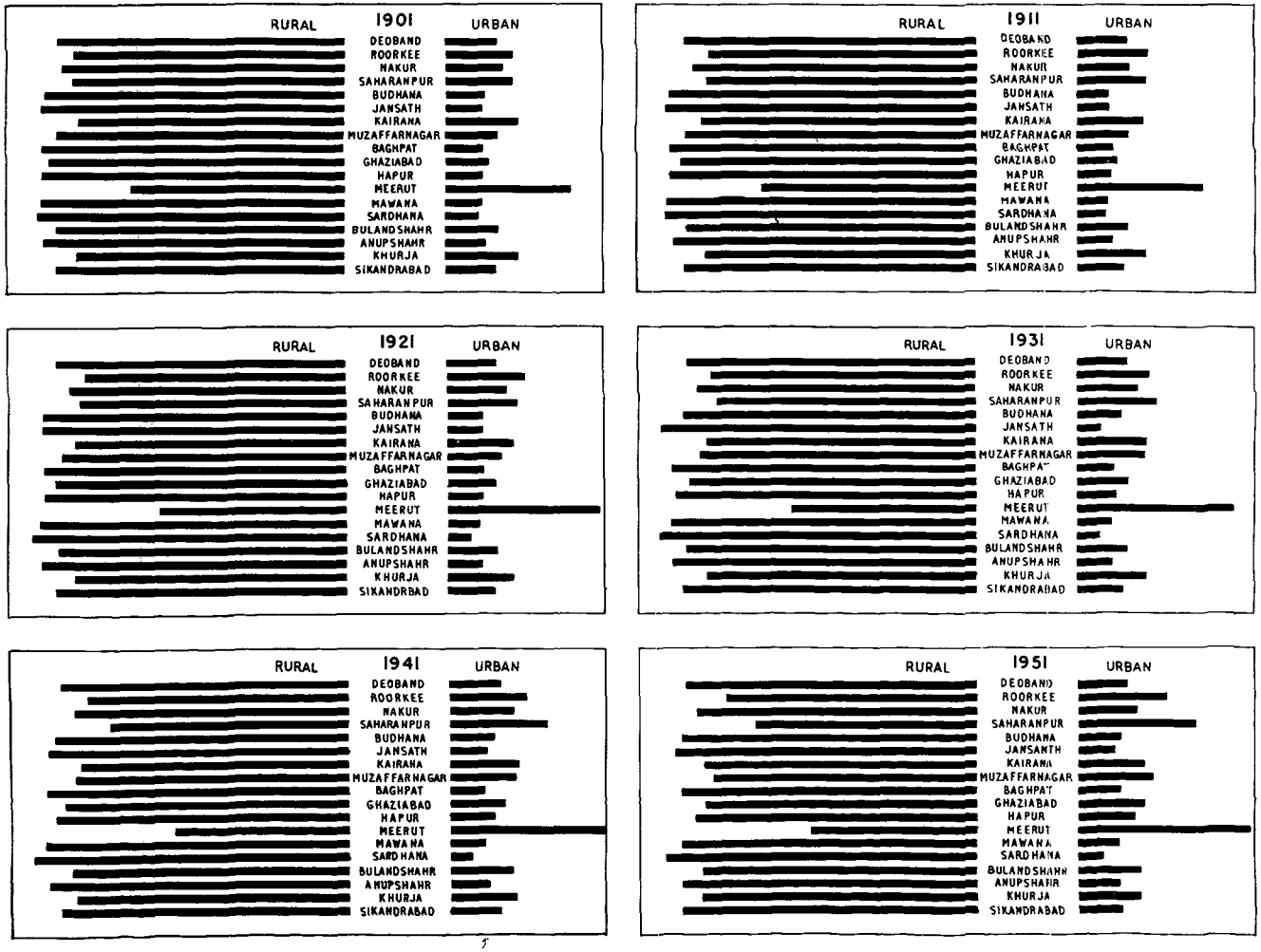
FIG. 28

Fig. 29

DECENNIAL PERCENTAL VARIATION OF RURAL & URBAN POPULATION

BY TAHSILS

1901—1951



(Based on Table 4.8)

with the average rural percentages of Uttar Pradesh that the Upper Doab region has throughout been appreciably less rural than the State taken as whole. The relatively high urban and less rural character of the Upper Doab region is also revealed by the comparison with the urban and rural population in different divisions of Uttar Pradesh. From table XLVII it will be seen that in 1951 the Upper Doab region was a very close second to Rohilkhand division in rural percentage. The percentage of rural population in Upper Doab was only 0.1 per cent higher than the percentage in Rohilkhand division. It will further be noted from this table that generally the rural percentages tended to increase from west to east. Some of the highest rural percentages were found in the extremely eastern divisions of Gorakhpur and Faizabad being 95.5 and 94.9 per cent respectively.

TABLE XLVI

INTERCENSAL PERCENTAL AND ABSOLUTE VARIATION BY DECADES IN THE RURAL POPULATION OF UPPER DOAB AND U.P. 1901-1951

Region	Rural population	1901	1911	1921	1931	1941	1951
1	2	3	4	5	6	7	8
Upper Doab	Absolute	3804724	3722066	3593621	3870710	4436421	5080626
	Percentage	82.8	83.9	83.7	82.9	81.0	79.9
U.P.	Absolute	43228993	43234234	41732867	44207881	49511578	54590043
	Percentage	88.9	89.8	89.4	88.8	87.6	86.4

S O U R C E : Census of India, U.P. Provincial Tables 1901,1911,1921,1931 1941 & 1951.

contd.

population some have also been treated as a town or urban area for census purposes, having regard to the character of the population, the relative density of the dwellings, the importance of the place as a centre of trade and its historic associations. All other areas are classified as rural". (Census of India 1951, Vol.II U.P. Part I-A-Report, p.110).

TABLE XLVII

RURAL AND URBAN POPULATION BY DIVISIONS OF U.P. 1951

Division	P O P U L A T I O N			
	Rural	Percentage	Urban	Percentage
1	2	3	4	5
U.P.	54,590,043	86.4	8,625,699	13.6
Upper Doab	5,080,626	79.9	1,275,879	20.1
Gorakhpur	8,437,981	95.5	393,260	4.5
Faizabad	7,935,636	94.9	427,077	5.1
Kumaon	2,037,352	94.3	122,630	5.7
Benaras	5,998,984	87.6	850,047	12.4
Lucknow	6,220,503	87.0	931,734	13.0
Jhansi	2,453,328	84.9	435,194	15.1
Agra	4,889,731	80.5	1185671	19.5
Allahabad	5,586,323	80.3	1,374,115	19.7
Rohilkhand	5,759,173	79.8	1,458,493	20.2

S O U R C E : Adapted from table 89, Census of India 1951, Vol.II, U.P. Part I-A-Report p.114.

contd.

The above quoted definition is almost the same as was adopted in earlier censuses. Mr. Blunt in his report on 1911 census states that " the next dividing line is passed when the non-agricultural population grows so large that the chauki-dari (village watchman) cess becomes too small to pay for sufficient watch and ward. Act XX of 1856, which permits of the raising of a house tax for the payment of watchman of a better class, is imposed: as such a tax is never levied from a merely agricultural population its existence is evidenced that the place is more or less urban in character. As the town increases in its non-agricultural popula-tion, it may become a notified area or a municipality". (Census of India 1911, Vol.XV, U.P. Agra and Oudh, Part I, Report p.23). Similarly Mr. Turner reports that a ' town ' was defined as :

(1) any area in which United Provinces Act II of 1916 is in force, i.e., any municipality;
(2) any area under section 337 and 339 of United Provinces Act II of 1916, i.e., any notified area;

1. GROWTH OF RURAL POPULATION

Districtwise changes in the rural population since 1901 are itemized in Table XLVIII showing total rural population alongside with the absolute and percental variation and the mean decennial growth-rate.[2] It will be seen from this table that the rural population did also follow more or less the same pattern of growth as was followed by the general population. In the growth of rural population to the year 1921 stood as a great population divide. Upto 1921 the rural population continued to decline in all the districts. Thenceforth the rural population continued to grow at a relatively rapid rate. However, the acceleratory trend of the growth seems to have stopped or rather slightly reversed after the year 1941. This is what both the percental variations and the mean decennial growth-rates indicate Figs.30(a) and 32. It was only in Saharanpur that the growth rate continued to accelerate whereas in the

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contd.

(3) any area under United Provinces Act II of 1914, i.e., any town area;
(4) any cantonment;
(5) any other continuous group of houses permanently inhabited by not less than 5,000 persons which having regard to the character of the population, the relative density of the dwellings, the importance of the place as a centre of trade and its historic associations; the Provincial Census Superintendent decided to treat as a town". (Census of India 1931, U.P. of Agra and Oudh, Vol.XVIII, Part I-Report pp.121-122).

In 1921 also more or less a similar definition of towns was adopted by Mr. Edye. He says that " a town is -

(i) Every continuous group of houses permanently inhabited by not less than 5,000 persons.
(ii) Every area in which Act II of 1914 or Act of 1916 is inforce.

A city was defined simply as a large town declared to be such by the Local Government.

The ' urban ' population is the sum of the people living in the towns and cities. The rural population is what remains". Census of India 1921, U.P. of Agra and Oudh, Vol.XVI, Part I - Report, p.33

2. There are some differences in the figures for the first four decades given in this table and those given in the District Census Handbooks for 1951. These difference are due to the fact that the figures in table XLVIII are taken from the original census records of the respective years and are used without any adjustment whereas the Census Handbook figures have been adjusted to the districts as they were in 1951.

TABLE XLVIII

VARIATION OF RURAL POPULATION BY DISTRICTS
1901-1951

District/Year	Population Rural	Intercensal Variation Absolute	Intercensal Variation Percentage	Mean Decennial growth-rate
1	2	3	4	5
SAHARANPUR				
1901	843,596	-	-	-
1911	804,250	- 39,346	- 4.66	- 4.77
1921	757,704	- 46,546	- 5.78	- 5.96
1931	835,416	77,712	10.25	9.75
1941	912,337	76,921	9.21	8.80
1951	1016085	103,748	11.37	10.76
MUZAFFARNAGAR				
1901	742,510			
1911	695,005	- 47,505	- 6.39	- 6.61
1921	680,666	- 14,339	- 2.06	- 2.09
1931	759952	79,286	11.65	11.01
1941	882000	122048	16.06	14.86
1951	1016552	134552	15.25	14.17

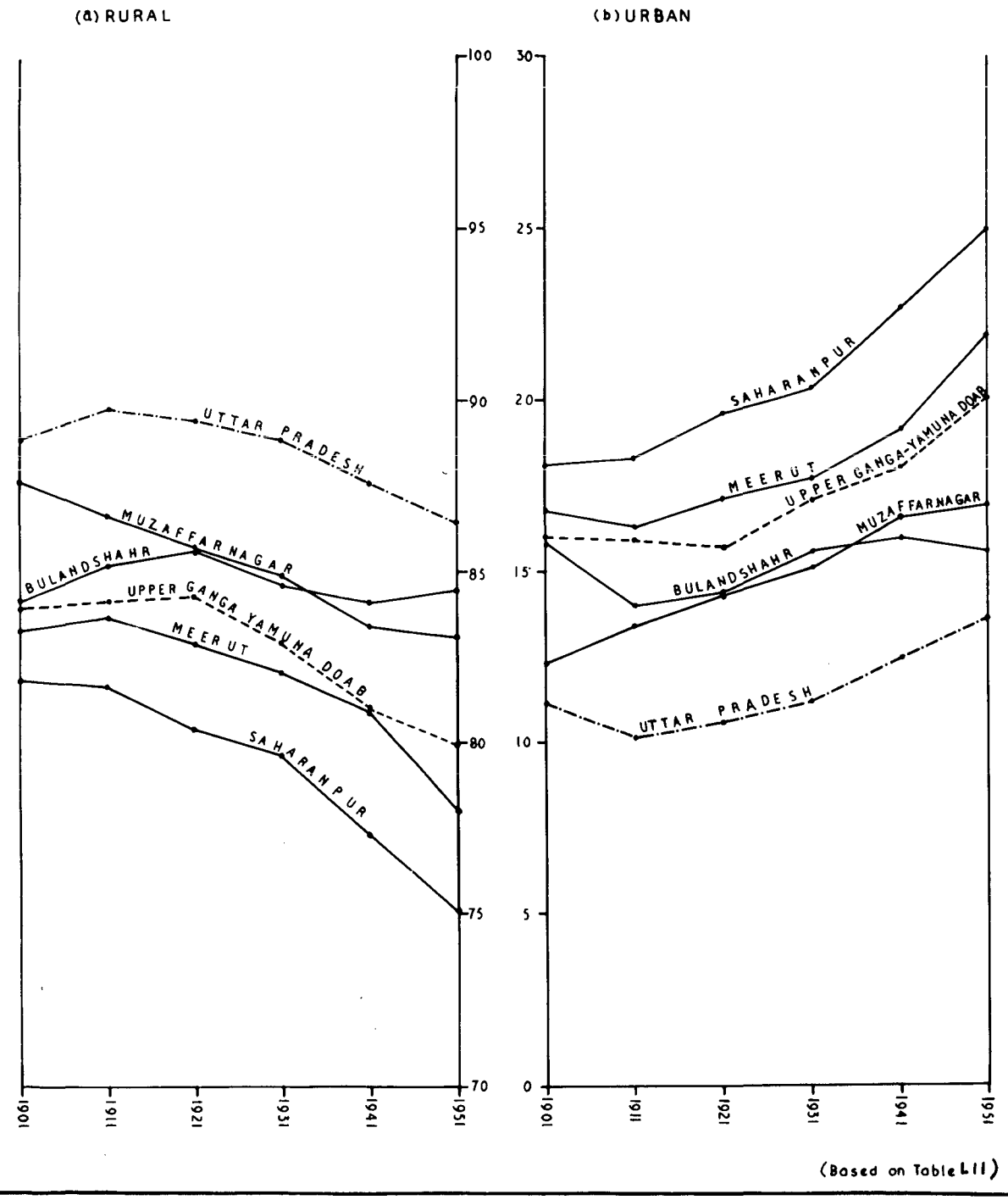
contd.

contd.

1	2	3	4	5
MEERUT				
1901	1,265,200			
1911	1,265,686	486	0.04	0.03
1921	1,241,948	-23,738	- 1.88	- 1.89
1931	1,313,325	71,377	5.75	5.58
1941	1,535,217	221,892	16.89	15.58
1951	1,781,541	246,324	16.04	14.85
BULANDSHAHR				
1901	953,418			
1911	957125	3,707	0.39	0.38
192 1	913,303	- 43,822	- 4.58	- 4.69
1931	962,017	48,714	5.33	5.19
1941	1106867	144,850	15.05	14.00
1951	1266448	159581	14.41	13.44

S O U R C E : Calculations based on data from Census of India, U.P. Provincial Tables 1901,1911,1921,1931,1941 and 1951.

PERCENTAL VARIATION OF RURAL & URBAN POPULATION BY DISTRICTS 1901-1951



(Based on Table L11)

FIG. 30 (a & b)

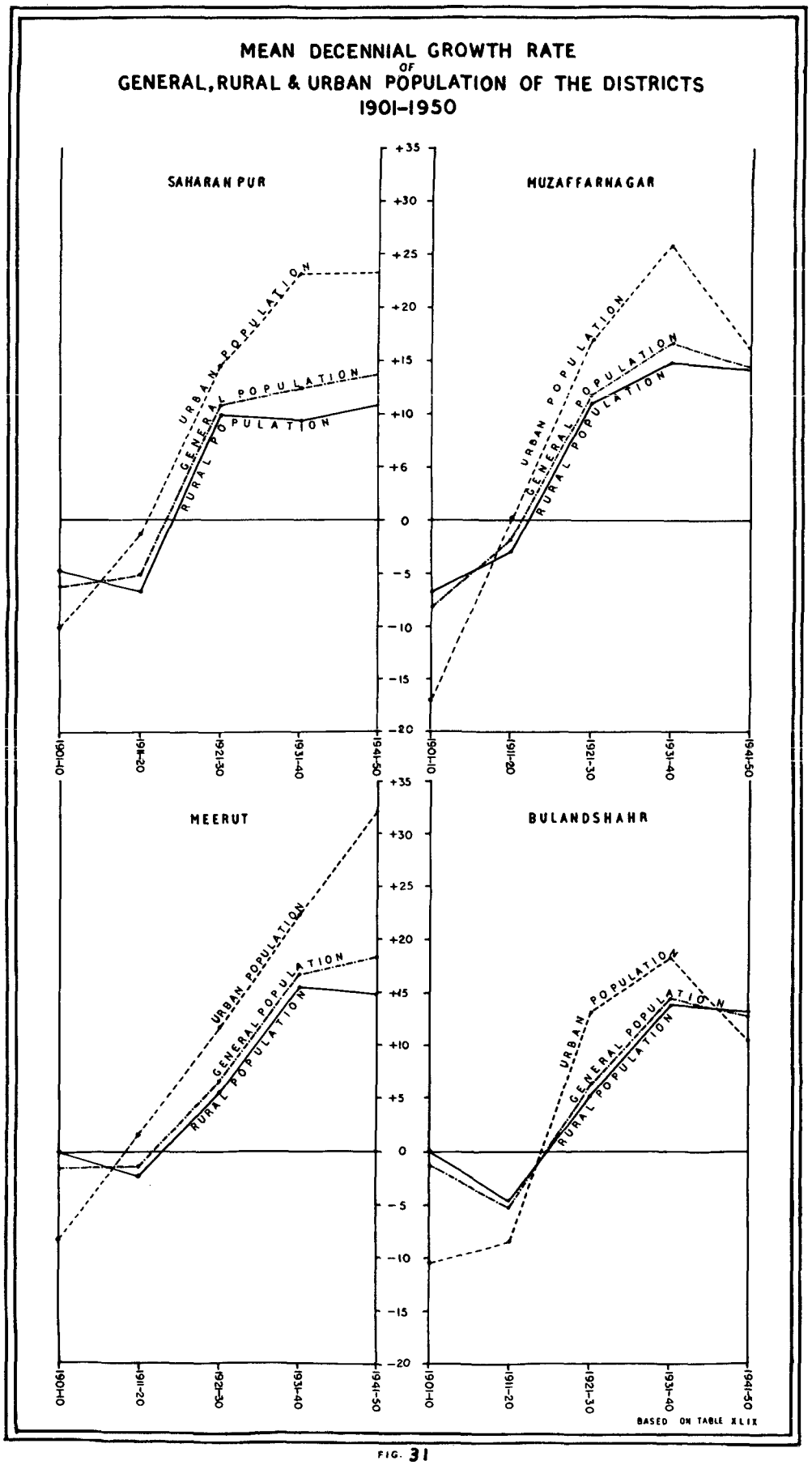

MEAN DECENNIAL GROWTH RATE
OF
GENERAL, RURAL & URBAN POPULATION OF THE DISTRICTS
1901-1950
SAHARAN PUR
MUZAFFARNAGAR
MEERUT
BULANDSHAHR
URBAN POPULATION
GENERAL POPULATION
RURAL POPULATION
+35
+30
+25
+20
+15
+10
+6
0
-5
-10
-15
-20
1901-10
1911-20
1921-30
1931-40
1941-50
BASED ON TABLE XLIX

FIG. 31

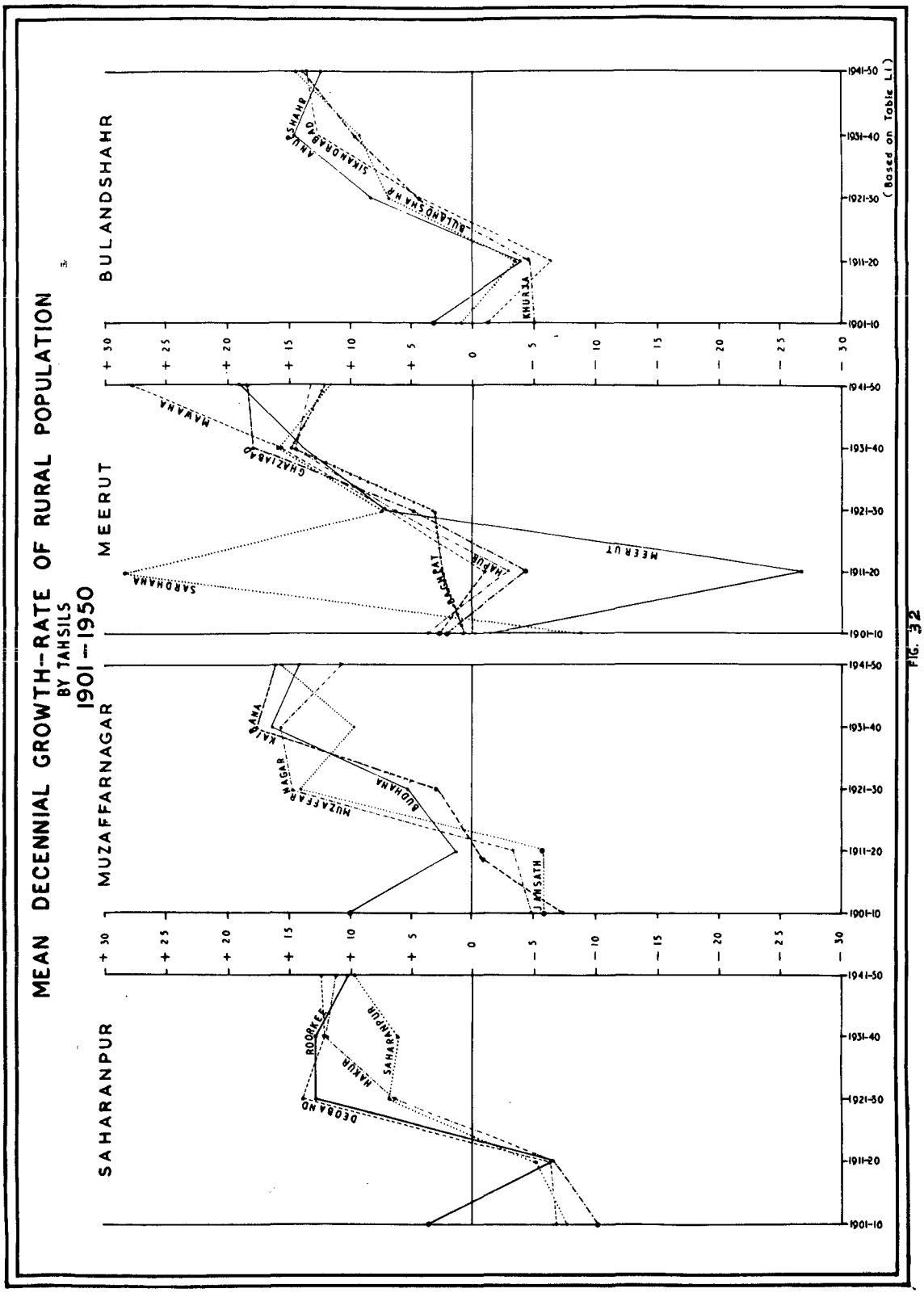

MEAN DECENNIAL GROWTH-RATE OF RURAL POPULATION
BY TAHSILS
1901 – 1950
SAHARANPUR
MUZAFFARNAGAR
MEERUT
BULANDSHAHR
(Based on Table I.)
1901-10
1911-20
1921-30
1931-40
1941-50
+30
+25
+20
+15
+10
+5
0
-5
-10
-15
-20
-25
-30
DEOBAND
ROORKEE
NAKUR
SAHARANPUR
JANSATH
BUDHANA
MUZAFFARNAGAR
KAIRANA
SHAMLI
THANA BHAWAN
GHAZIABAD
MEERUT
HAPUR
SARDHANA
KHURJA
BULANDSHAHR
SIKANDRABAD
ANUPSHAHR

FIG. 32

remaining three districts the growth-rates showed a slight decline. The decline in the growth-rate in each of the three districts was, however, less than 1 per cent compared with the mean decennial rate for the preceding decade. The absolute figures, on the other hand, indicate a steady increase in the total rural population during post - 1921 decades without being checked or stopped at or around 1941. According to the figures in column 3 of the table the increase in the rural population during the thirty years from 1921-1951 was considerable: it was 258,381 persons in Saharanpur, 335,886 persons in Muzaffarnagar, 539,593 persons in Meerut, and 353,145 persons in Bulandshahr giving a total increase of 1,487,005 persons in Upper Doab as a whole which was, incidentally, nearly equal to the total population of Meerut - the biggest district of the region - in 1921 and was appreciably greater than the total population of each of the three districts in that year.

Comparison with the growth-rates of general and urban population as shown in table XLIX indicates that the rural growth-rates ran almost parallel to the general growth-rates but were substantially surpassed by the urban growth-rates especially from the year of the Great Divide (Fig.31). The disparity in the growth-rates of the rural and urban population became strikingly accentuated during the thirties and forties as is clearly indicated by the pattern of lines in (Fig.32). Though some administrative changes had a hand in these differential rates of growth, but their effects were very small as well as a two-way affair. If a few formerly rural areas were classified as urban in the fifth and sixth censuses there were also a few formerly urban areas which were counted as rural in these censuses. As a random illustration may be cited the names of Bugrasi, Khanpur Gantu, and Khalaur of Bulandshahr which were recognized as urban areas

TABLE XLIX

MEAN DECENNIAL GROWTH-RATE FOR GENERAL, RURAL, AND URBAN POPULATION OF THE DISTRICTS
1901-1950

DISTRICT	Decade	Mean decennial growth-rate of General popula-tion	rural population	urban popula-tion
1	2	3	4	5
SAHARANPUR	1901 - 1910	- 6.27	- 4.77	-10.23
	1911 - 1920	- 5.08	- 5.96	- 1.29
	1921 - 1930	10.74	9.75	14.80
	1931 - 1940	12.27	8.80	24.71
	1941 - 1950	13.66	10.76	23.23
MUZAFFARNAGAR	1901 - 1910	- 8.16	- 6.61	-17.19
	1911 - 1920	- 1.79	- 2.09	0.21
	1921 - 1930	11.93	11.01	17.00
	1931 - 1940	16.60	14.86	25.88
	1941 - 1950	14.48	14.17	16.03
MEERUT	1901 - 1910	- 1.36	0.03	- 8.05
	1911 - 1920	- 1.36	- 1.89	1.35
	1921 - 1930	6.65	5.58	11.53
	1931 - 1940	16.80	15.58	22.39
	1941 - 1950	18.40	14.85	32.12

1	2	3	4	5
BULANDSHAHR	1901 - 1910	- 1.25	0.38	-10.25
	1911 - 1920	- 5.26	- 4.69	- 8.47
	1921 - 1930	6.42	5.19	13.26
	1931 - 1940	14.50	14.00	18.42
	1941 - 1950	12.96	13.44	10.40
UPPER DOAB	1901 - 1910	- 3.71	- 2.20	-10.60
	1911 - 1920	- 3.24	- 3.51	- 1.70
	1921 - 1930	8.49	7.42	14.60
	1931 - 1940	15.27	13.60	22.75
	1941 - 1950	15.33	13.52	22.89

S O U R C E : Same as for table XLVIII.

in 1931, 1941 and 1951 respectively and of Jarcha and Jhajar of the same district which lost their urban title in 1921 and 1931 respectively.

The relatively low rates of rural growth were principally due to emigration. Unfortunately direct statistical information about rural-urban migration is not available. However, an approximate assessment of the movement of population from the rural to the urban areas may be made by comparing the birth and death rates in the rural and urban population. The relevant vital statistics of the rural, urban and general population are set out in table L. It will be seen from the table that in many a case the birth-rate as well as the survival-rate of the rural population was higher than that of the urban population. This is a strong indication of the fact that the natural increase of the rural population was appreciably higher than the natural increase of urban population and, as such, the growth-rate of rural population must have also been nearly as much higher relative to urban growth-rate. But the fact is just the reverse of it. Inspite of a relatively low rate of natural increase the urban growth-rate was, for instance, more than double the rural rate in the districts of Saharanpur and Meerut in the decennium 1941-50. Migration is the only explanation of this position. In the absence of any statistics one cannot go beyond this generalized estimation of the importance of migration in causing higher rates of growth in urban population compared to the rural growth-rates.[3]

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3. There exists a theoretical possibility of computing the number of migrants by calculating the expected increase in rural and urban population according to the rates of natural increase and noting the difference between these and the relevant figures returned in the census records. The difference thus obtained will give a measure of immigration into urban centres and emigration from the rural areas. There is, however, no guarantee that the number of migrants thus computed have all gone to the urban areas or have all come from the rural areas. It is quite possible that the rural emigrants might have gone to some other villages across the district borders and since the figures for villages are not entered by place of birth no check on the computed figures is possible. It is on this ground that this type of calculation for the number of migrants has not been attempted.

TABLE L

MEAN DECENNIAL VITAL STATISTICS OF RURAL, URBAN AND GENERAL POPULATION BY DISTRICTS, 1921-1950

District	Decade	MEAN DECENNIAL								
		Birth rate of			Death rate of			Rate of natural growth of		
		Rural	Urban	Gen.	Rural	Urban	Gen.	Ruran	Urban	Gen.
1	2	3	4	5	6	7	8	9	10	11
SAHARANPUR	1921 - 30	42.8	33.5	41.0	30.6	30.1	30.5	12.2	3.4	10.5
	1931 - 40	39.8	38.7	39.6	38.4	32.7	29.3	11.4	6.0	10.3
	1941 - 50	29.7	36.5	31.3	19.9	27.5	21.7	9.8	9.0	9.6
MUZAFFARNAGAR	1921- 30	39.7	17.4	36.4	25.0	12.2	23.2	14.7	5.2	13.2
	1931- 40	40.8	32.5	39.5	22.8	18.9	22.2	18.0	13.6	17.3
	1941- 50	27.4	34.6	28.6	15.5	18.6	16.0	11.9	16.0	12.6
MEERUT	1921- 30	43.6	16.5	38.8	30.4	12.0	27.2	13.2	4.5	11.6
	1931- 40	40.3	28.2	38.0	23.2	16.2	21.9	17.1	12.0	16.1
	1941- 50	29.7	30.9	29.0	16.8	17.2	16.9	12.9	13.7	13.0
BULANDSHAHR	1921- 30	44.3	22.0	40.9	33.1	18.8	30.9	12.2	3.2	10.0
	1931- 40	44.0	37.3	42.9	26.7	25.9	26.6	17.3	11.4	16.3
	1941- 50	32.2	37.7	33.1	19.1	24.9	20.0	13.1	12.8	13.1

SOURCE : Adapted from tables given in District Census Handbooks of Saharanpur, Muzaffarnagar, Meerut and Bulandshahr, 1951. p.iv.

During the pre-1921 period and especially during the first decade the migration was not an effective force as is evidenced from the comparison of the rural urban growth-rates. In the first decade the loss in urban population was greater than what it was in the rural population. It will be noted from table XLIX that in Bulandshahr for instance, the mean decennial rate of decline of the urban population in the decade 1901-10 was 10.25 per cent against an increase of 0.38 per cent of the rural population. Simi-larly the urban population of Meerut suffered a decline of about 8 per cent whereas the rural population recorded again at the rate of 0.03 per cent. But during the second decade the growth-rate of urban population staged a grand recovery and shot ahead of the growth-rate of rural population by substantial margain in all the districts except Bulandshahr. The table shows that in Upper Doab as a whole the urban decline-rate in the second decade reduced to a mere 0.52 per cent compared with the rural decline-rate of 3.51 per cent whereas in two districts namely Muzaffarnagar and Meerut the urban population made a positive growth at the rates of 0.21 and 1.35 per cent against the decline in rural population at the rates of 2.09 and 1.89 per cent respectively.

The lag in the rural growth-rate relative to that of the urban was not due to emigration; it was rather caused by heavy casualties in the rural population by the visitation of the influenza epidemic in the later part of the second decade. According to Mr. Edye's[4] report the epidemic broke out in the

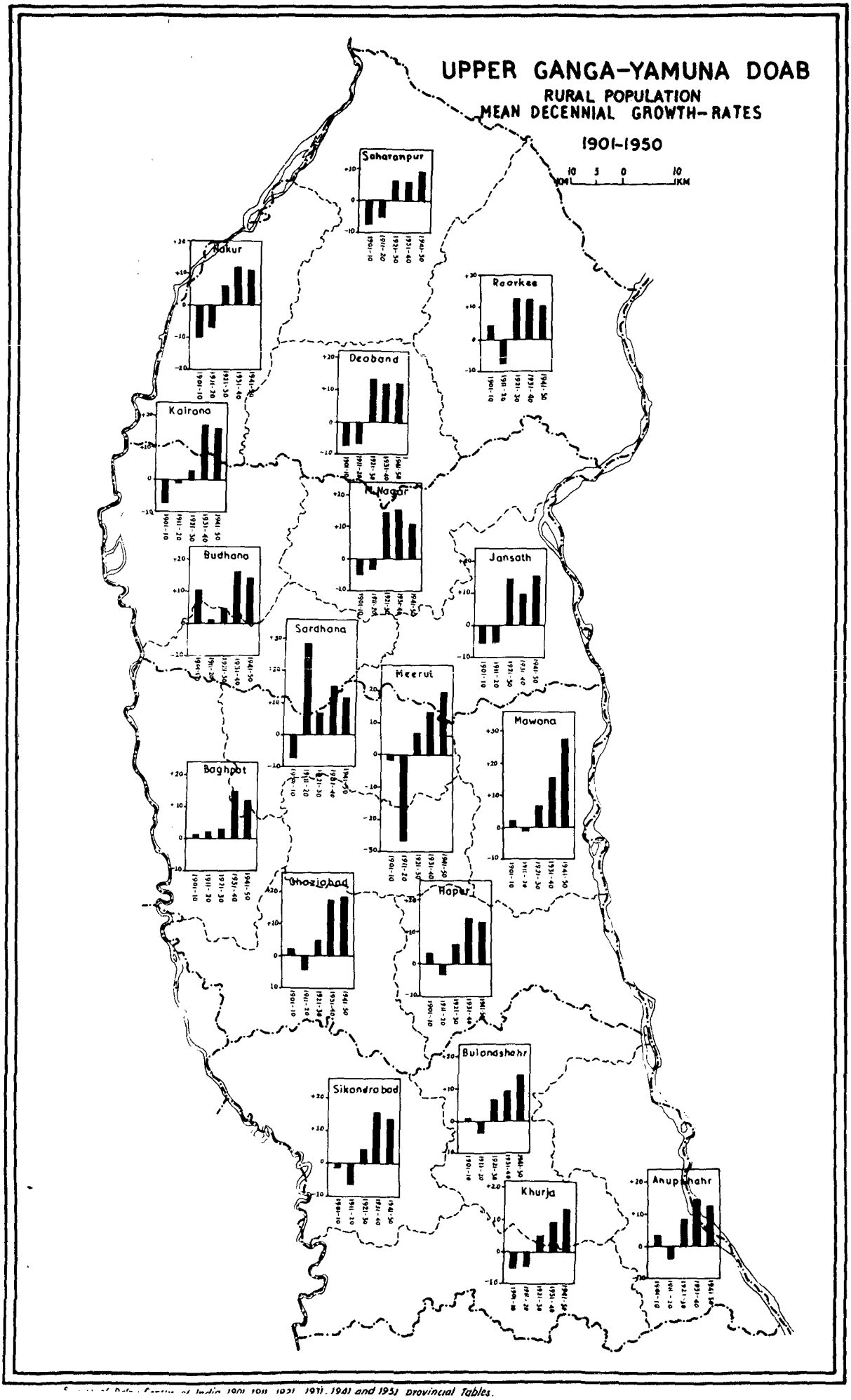
4. Edye, E.H.H., Census of India 1921, U.P. of Agra and Oudh, Vol.XVI Part I-Report pp.34-35. A short extract from this report would be quite relevant here. On page 35 Mr. Edye reports that " the influenza epidemic of 1918 occurred at the busiest period of the agricultural year when the autumn harvest had to be got in and the land prepared for the spring crop. 'At this period to stop the work means to the peasantry at worst ruin and at best serious loss. According to medical opinion the only treatment for influenza is absolute rest and good nursing. This treatment was more or less possible for town dwellers in the autumn of 1918, but for the cultivators it was not. These latter carried on at their work after they had felt the onset of the disease and until they were no longer able to stand, as was witnessed probably by all who were on tour in their districts at the time."

autumn of 1918 at which time the peasants could not afford the absolute rest which " according to medical opinion (is) the only treatment for influenza." The peasants " carried on at their work after they had felt the onset of the disease" and consequently the toll of life in the rural areas was relatively high.

2. REGIONAL PATTERN OF VARIATION

The growth-rate and percental variation of population of a district do not necessarily indicate the nature of dynamism of the numbers in every part of the district. The indices of population variation may vary, quite often noticeably, from component to component of a district. There was infact considerable regional variation in the mean decennial growth-rates and intercensal percental variations on tahsil level. The mean decennial growth--rates of the tahsils of Upper Doab for fifty years 1901-1950 are tabulated in table LI and shown in Fig.33. It will be seen from the table that the decline-rates during the first two lean decades ranged from -10.04 per cent in Nakur to -1.33 per cent in Sikandarabad and from 26.62 per cent in Meerut to -1.2 per cent in Mawana respectively. This great disparity in the growth--rates during these decades of decline was further accentuated by the record of actual increase in some tahsils. In the first decade the tahsils Budhana (- 10.08 per cent), Hapur (- 3.75 per cent), Roorkee (3.68 per cent), Anupshahr (3.07 per cent), Mawana (2.57 per cent), Ghaziabad (n2.13 per cent), Bulandshahr (1.14 per cent) and Baghpat (0.80 per cent) recorded an actual gain relative to the respective total of 1901. In other words eight tahsils out of the eighteen or 44.4 per cent of the tahsils did not suffer any loss in rural population. In the second decade this number reduced to only three tahsils namely Sardhana (28.49 per cent)[5], Baghpat (2.24 per cent), and

5. The extraordinary indices of decline and growth rates in Meerut and Sardhana tahsils are purely an outcome of the administrative changes. It has already been pointed out that after 1911 the north-eastern horn of Meerut tahsil was shorn off and, after being constituted as a separate pargana(Daurala), was made part of Sardhana tahsil.



Source of Data : Census of India 1901 1911 1931 1941 and 1951 Provincial Tables.

FIG. 38

TABLE LI

MEANS DECENNIAL GROWTH RATE OF RURAL POPULATION BY TAHSILS, 1901-1950

Tahsil	Mean decennial growth rate during the decade				
	1901-10	1911-20	1921-30	1931-40	1941-50
1	2	3	4	5	6
Deoband	- 6.9	- 6.5	13.8	12.05	12.3
Roorkee	3.68	- 6.77	12.83	12.78	10.4
Nakur	- 10.40	- 6.77	6.25	12.00	11.16
Saharanpur	- 7.77	- 5.17	6.59	6.01	9.66
DISTT. SAHARANPUR	- 4.77	- 5.96	9.75	8.80	10.76
Budhana	10.08	1.31	5.10	16.3	14.38
Jansath	- 5.75	- 5.62	14.34	9.81	15.76
Kairana	- 7.37	- 0.65	3.00	17.56	16.12
Muzaffarnagar	- 4.92	- 3.47	14.73	15.84	10.94
DISTT. MUZAFFARNAGAR	- 6.61	- 2.09	11.01	14.86	14.17
Baghpat	0.80	2.24	3.06	14.86	12.06
Ghaziabad	2.13	- 4.53	4.74	17.79	18.39
Hapur	3.75	- 3.08	6.21	14.64	13.36
Meerut	- 1.65	- 26.62	7.20	13.82	18.92
Mawana	2.57	- 1.20	6.70	15.64	27.84
Sardhana	- 8.80	28.49	7.11	15.68	11.82
DISTT. MEERUT	0.03	- 1.89	5.58	15.58	14.85
Bulandshahr	1.14	- 3.74	6.95	9.32	14.40
Anupshahr	3.07	- 3.80	8.23	14.70	12.40
Khurja	- 5.15	- 4.80	4.40	9.66	13.85
Sikandarabad	- 1.33	- 6.43	4.26	15.52	13.56
DISTT. BULANDSHAHR	0.38	- 4.69	5.19	14.00	13.44
UPPER DOAB	- 2.20	- 3.15	7.42	13.60	13.52

S O U R C E : Calculated from tahsil figures derived from the data given in the Provincial Tables, Census of India, U.P. 1901,1911,1921,1931,1941 and 1951.

Budhana (1.31 per cent). In the subsequent three decades though none of the tahsils suffered a loss yet the regional variation in growth-rates was considerable and well-marked. These variations in growth-rates are shown in (Figs.32 and 27). From the table and the Figs. it will, however, be seen that the tahsils which suffered substantial loss during the earlier decades did not necessarily record relatively small gains in the growth-rates during the subsequent decades. Only those tahsils of decline which were either agriculturally precarious or contained towns of some importance could not register substantial increase in the rates of growth during the third, fourth or fifth decade. Tahsil Nakur of Saharanpur district, for instance, which suffered most heavily during the first two decades had the lowest gain during the third. Since the tahsil, though agriculturally poor, did not contain any town of significance the rural growth-rates in the fourth and fifth decades managed to become above the respective district averages. On the other hand Saharanpur tahsil which was the second worst sufferein the district during the first two decades was the lowest gainer in the last two decades. This was mainly due to the fact that besides not being agriculturally well-placed as considerable portion of the tahsil is occupied by submon--tane tract and Yamuna khadir it also contained the biggest town of the district which became the main centre of attraction for the rural population during the post-Great Divide period.

Exactly identical situation existed in the Muzaffarnagar district. Tahsil Jansath besides being agriculturally most precarious was also the least urban in the district. The tahsil was the worst sufferer during the first and second decades but recorded fairly high rates of growth during the third and fifth decades. On the contrary tahsil Muzaffarnagar which was

the second worst sufferer in the earlier decades had the lowest growth-rate in the fifth decade whereas in the fourth decade it had the second lowest rate. Tahsils' lowest growth-rate of 10.94 in the district for the decade 1941-50 was mainly due to the presence of the rapidly growing district headquarters of Muzaffarnagar.

The distribution of growth-rates in Meerut district also seem broadly to conform with this pattern of tahsil-wise variation. The lowest rate of mean decennial growth in the decennium 1941-50 was obtained for tahsil Sardhana which suffered at the highest rate of more than eight per cent in the district during the decade 1901-10.

In Bulandshahr also a somewhat similar pattern was followed by the rural growth-rates. Khurja tahsil had the highest rates of decline during the first two decades and then in the subsequent two decades the growth-rates obtained for the tahsil were among the lowest in the district. Tahsil Sikandarabad which was the greatest loser in the second decade had the lowest growth-rate in the subsequent third decade. However the two tahsils made notable recovery in respect of growth-rates during the fifth and fourth decades respectively.

The regional pattern of differential rurality will not be complete unless the percental variation in rural population of the tahsils is also considered. Table LII shows tahsil-wise decennial percentages of the rural population from 1901 and table LIII incorporates comparison between percental variation of general and rural population of tahsils in fifty years and the two selected periods namely 1901-31 and 1931-51. From table LII and Figs.34,35 and 36 it will

TABLE LII

GROWTH OF RURAL POPULATION ABSOLUTE AND PERCENTAL BY TAHSILS, 1901-1951

1911		1921		1931		1941		1951	
Absolute	Percentage of total pop.	Absolute	Percentage of total pop.	Absolute	Percentage of total pop.	Absolute	Percentage of total pop.	Absolute	Percentage of total pop.
4	5	6	7	8	9	10	11	12	13
174,846	85.58	163,798	85.55	188,112	85.03	201,602	84.80	227,983	85.40
232,483	79.58	217,250	78.22	245,483	79.43	274,995	77.13	304,385	74.08
150,735	83.86	140,855	82.08	149,947	81.92	168,254	81.07	189,067	82.95
246,186	79.12	235,801	79.11	251,874	76.20	267,485	70.83	294,650	65.77
804,250	81.67	757,704	80.82	835,416	80.02	912,337	77.35	1,016,085	75.06
160,067	90.45	162,186	89.60	170,684	86.91	200,977	86.87	232,132	87.23
177,182	88.65	167,488	89.83	193,368	92.81	213,328	88.86	249,828	89.14
164,519	80.41	163,450	80.14	179,574	79.55	214,145	79.27	251,691	80.22
193,237	85.14	187,542	84.13	216,326	81.87	253,550	80.43	282,901	78.00
695,005	86.59	680,666	85.69	759,952	84.94	882,000	83.46	1,016,552	83.20
264,121	89.76	270,110	89.40	278,524	89.29	323,260	89.34	364,747	87.42
235,807	84.59	225,343	85.73	236,036	84.39	283,933	83.96	342,451	80.54
226,403	89.96	219,530	89.26	233,605	88.45	270,519	86.86	309,246	83.38
210,673	62.86	160,870	55.46	172,889	54.13	198,565	51.73	240,056	49.47
179,762	91.00	167,688	90.30	179,238	89.96	209,647	89.59	244,410	87.86
148,920	91.55	198,407	93.45	213,033	93.56	249,293	93.25	280,631	92.11
1,265,686	83.30	1,241,948	82.88	1,313,325	82.07	1,535,217	80.94	1,781,541	78.09
283,506	85.08	272,098	85.00	282,771	82.30	321,401	81.79	371,299	81.47
247,685	89.42	238,359	89.88	258,816	89.76	299,900	88.25	339,568	87.80
206,713	79.86	197,023	80.20	205,904	79.66	242,377	80.15	278,464	81.85
219,221	86.05	205,823	86.14	214,526	86.54	243,189	85.25	277,117	87.35
957,125	85.16	913,303	85.63	962,017	84.61	1,106,867	84.03	1,266,448	84.43
3,722,066	83.09	3,593,621	83. 7	3,870,710	82.90	4,436,421	81.00	5,080,626	79.90
43,234,234	89.80	41,738,867	89.40	44,207,881	88.80	49,511,578	87.60	54,590,043	86.40

TABLE LIII

INTERCENSAL PERCENTAL VARIATION OF GENERAL AND RURAL POPULATION BY TAHSILS, 1901-1951

Tahsil	1901-1931		1931-1951		1901-1951	
	General	Rural	General	Rural	General	Rural
1	2	3	4	5	6	7
Deoband	0. 5	0.34	20.68	21.19	21. 0	21.61
Roorkee	8. 0	6.98	32.23	25.08	43. 0	34.97
Nakur	-12. 0	-11.03	24.51	25.42	9. 0	9.98
Saharanpur	- 1. 0	- 5.07	35.53	16.98	34. 0	9.76
SAHARANPUR DISTT	- 0. 6	- 0.97	29.66	21.62	28.88	22.44
Budhana	- 0. 3	- 2. 3	34.92	36. 0	34. 0	32.87
Jansath	- 4. 0	3.03	34.56	29.19	30. 0	33.11
Kairana	- 0. 5	1.38	38.99	40.16	40. 0	42.11
Muzaffarnagar	11. 0	6.56	37.30	30.77	52. 0	39.36
MUZAFFARNAGAR	1.99	2.35	36.56	33.75	39.28	36.91
Baghpat	4. 8	6.33	33.79	30.95	40. 3	39.24
Ghaziabad	1. 0	2.25	52.08	45.08	53. 8	48.35
Hapur	8. 5	7.13	40.42	32.37	52. 3	41.82
Meerut	- 6. 7	-20.16	51.94	38.85	41. 8	10.85
Mawana	- 0. 6	2.31	39.61	36.36	38. 8	39.51
Sardhana	26. 4	30.99	33.72	31.73	69. 0	72.56
MEERUT DISTT.	4.00	3.80	42.40	35.65	48.11	40.81
Bulandshahr	3. 0	0.87	33.16	29.82	37. 2	32.47
Anupshahr	3. 7	6.95	34.13	31.20	39. 0	39.98
Khurja	-10. 5	-1.87	31.62	35.24	17. 8	32.70
Sikandarabad	- 5. 0	-3.87	27.97	29.17	21. 6	24.23
BULANDSHAHR	- 0. 9	0.90	31.92	31.64	31.80	32.83

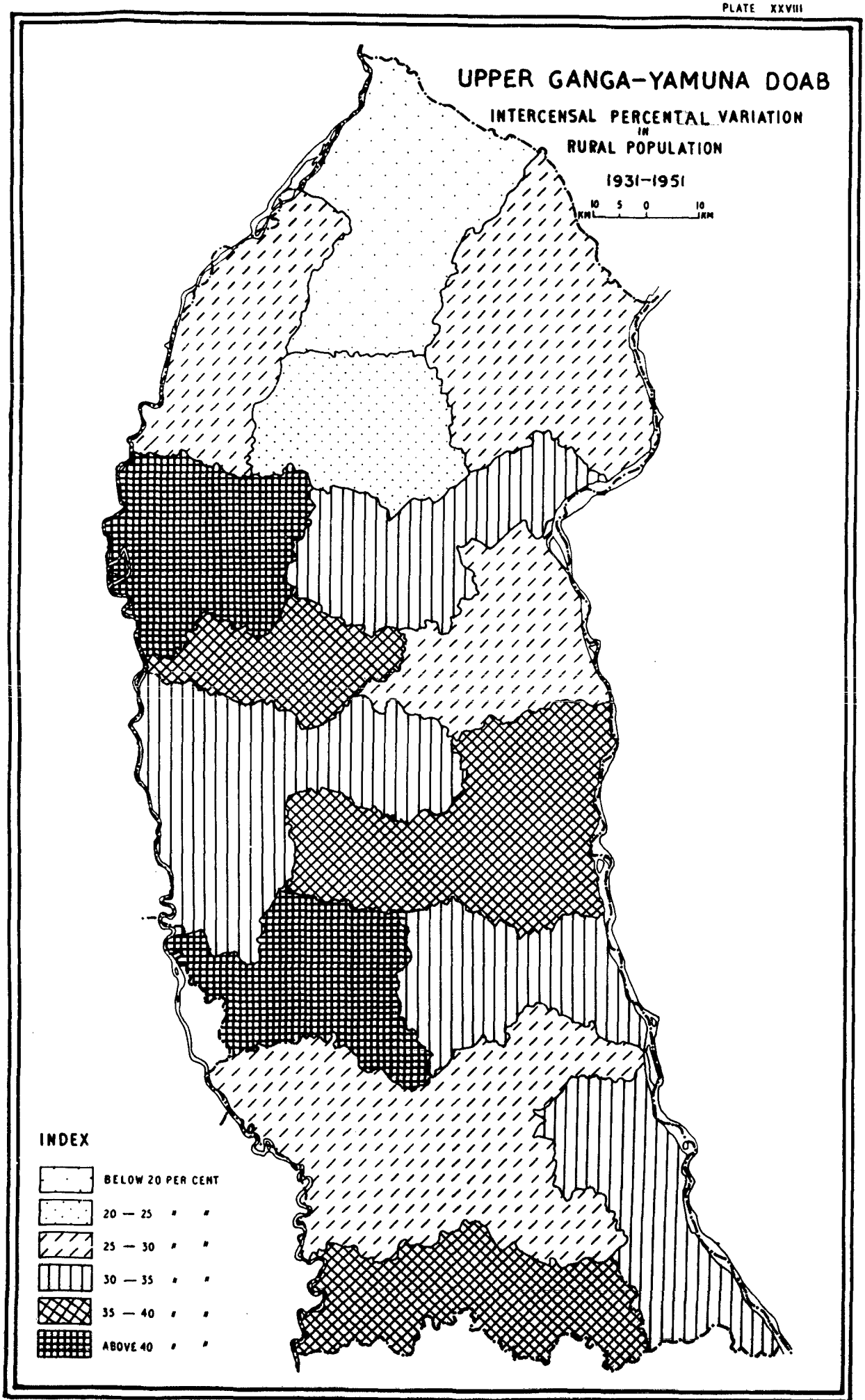
S O U R C E : Calculations based on data from Census of India, U.P. Provincial Tables 1901, 1931 and 1951.

PLATE XXVII

Source of Data: Census of India 1901, vol. XVI A, pt II and 1931, vol. XVIII, pt II and Distt. Gaz. 1903

FIG. 34

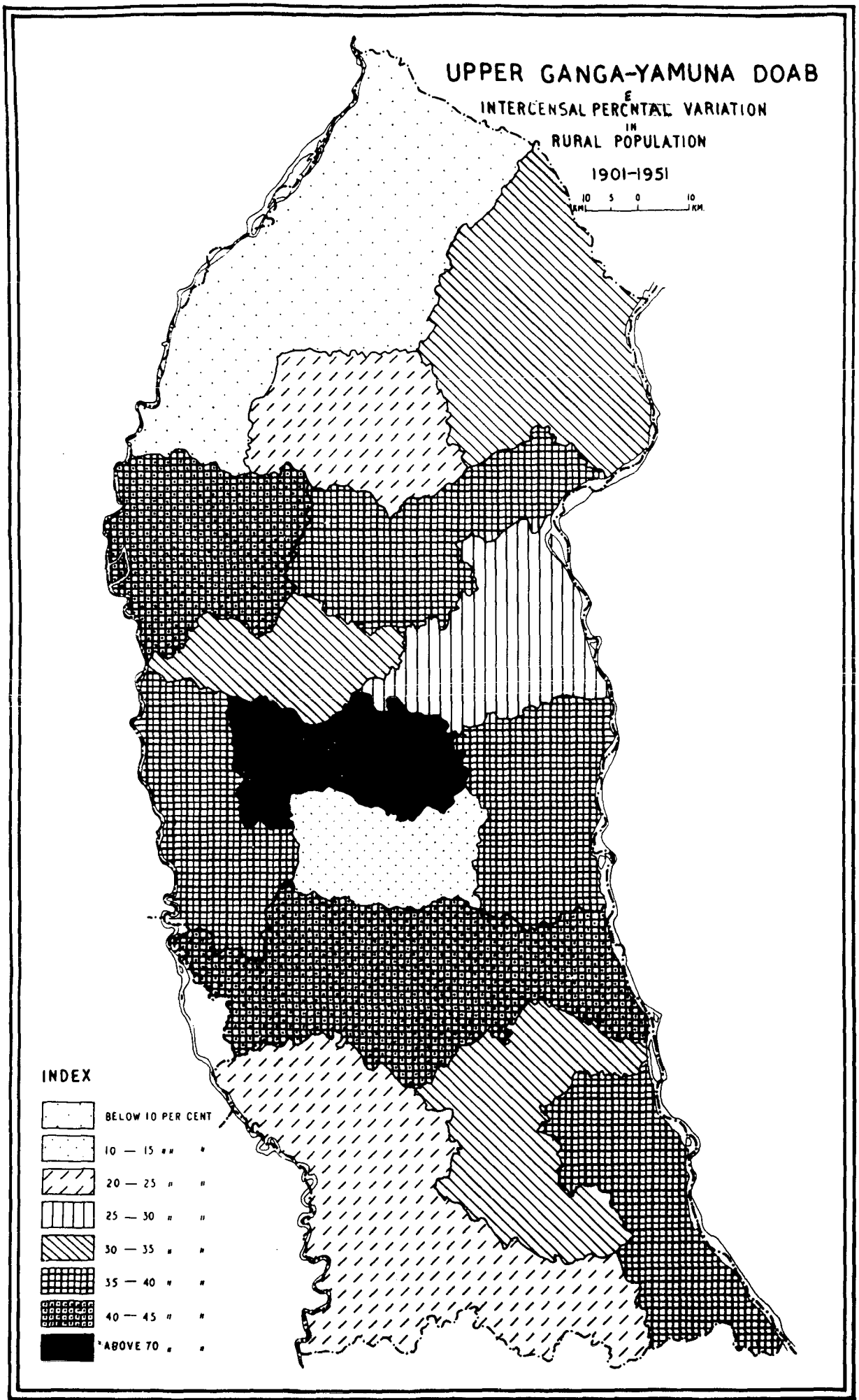
PLATE XXVIII



Source of Data : Census of India 1931, Vol. XXIII, pt. II and Distl. Census Handbooks 1951

FIG. 35

PLATE XXIX



Source of Data: Census of India 1901, Vol. XVI-A, pt. II; and Distt census Handbooks 1951 and Distt. Gaz. 1903

FIG. 36

seen that the general pattern of the distribution of rurality remained almost unchanged during the fifty-year period. The tahsils that had higher rural percentages in 1901 still held more or less the same relative positions in the district in 1951 with the sole exception of Muzaffarnagar tahsil which infact lessened its rural character more than was done by any tahsil of the district.

3. GROWTH BY CATEGORIES

If the intensity of rurality be graded as very high, high, medium and low according as the rural population percentage is above or equal to the State average, above the Upper Doab average, equal or nearly equal to the Upper Doab average and appreciably below the Upper Doab average respectively then there were, at the time of 1901 census, six tahsils which had a very high rurality, five tahsils which were under the high category, two tahsils which belonged to the medium category and five tahsils which pertained to the low category of rurality.

This position was not much changed in 1951. In this year seven tahsils belonged to the very high class, five to the high category, two to the medium grade and four to the low category. A noteworthy point is that the majority of the tahsils maintained their categories and there were only a few which recorded change. Table LIV gives the categorized arrangement of the tahsils in 1901, 1931 and 1951. Among the very high' category' tahsils of 1901, for instance, it was only Hapur tahsil which increased its urban population at a relatively high rate to enter into the 'high' category in 1951. The change of category amongst the high intensity tahsils of 1901 was relatively more marked. Out of the five tahsils only one (the Deoband tahsil) could retain its category the whole

TABLE LIV

TAHSILS CLASSIFIED ACCORDING TO ITENSITY OF RURAL PERCENTAGE FOR THE YEAR 1901,1931 & 1951

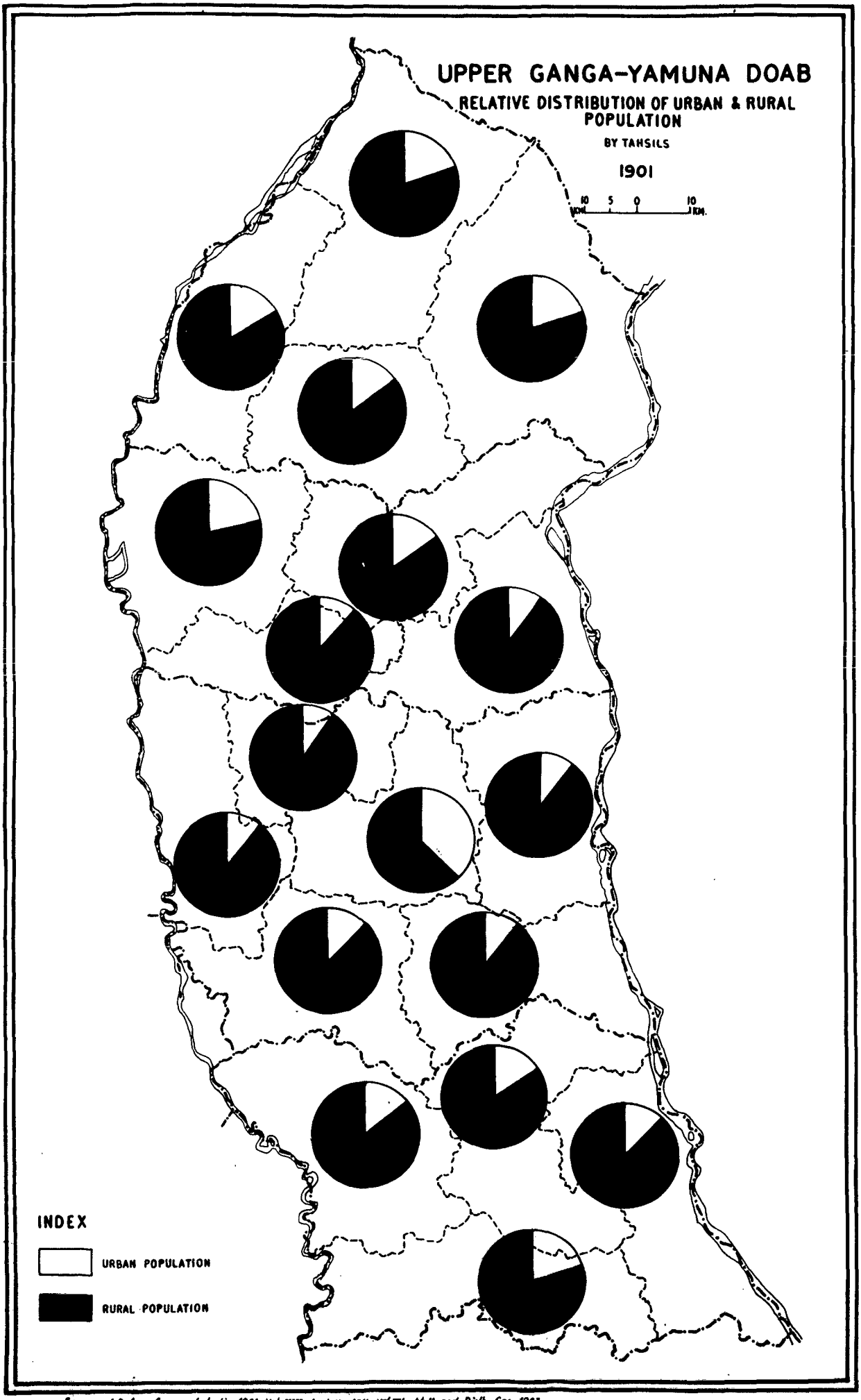
Very High (Above or about the state averages: 88.9;88.8 & 86.4 p.c.)		High (Above the Upper Doab) averages: 82.8;82.9 & 79.9 p.c.)		Medium (Equal or nearly equal the Upper Doab averages)		Low (Below the Upper Doab averages)	
Tahsil	Year	Tahsil	Year	Tahsil	Year	Tahsil	Year
1	2	3	4	5	6	7	8
1. Budhana	1951	1. Deoband	1901 1931 1951	1. Nakur	1901 1931	1. Roorkee	1901 1931 1951
2. Jansath	1931 1951	2. Nakur	1951	2. Kairana	1951	2. Saharan pur.	1901 1931 1951
3. Baghpat	1931 1951	3. Jansath	1901	3. Ghaziabad	1951	3. Budhana	1901
4. Hapur	1901	4. Muzaffarnagar	1901	4. Bulandsha hr.	1931	4. Kairana	1901 1931
5. Mawana	1931 1951	5. Baghpat	1901			5. Muzaffar nagar	1931 1951
6. Sardhana	1901 1931 1951	6. Ghaziabad	1901 1931			6. Meerut	1901 1931 1951
7. Anupshahr	1931 1951	7. Hapur	1931 1951			7. Khurja	1901 1931
8. Sikandara -bad	1951	8. Mawana	1901				
		9. Sikandara bad	1901 1931				
		10. Anupshahr	1901				
		11. Budhana	1931				
		12. Bulandshahr	1901 1951				
		13. Khurja	1951				

S O U R C E : Calculations based on data from Census ofIndia, U.P. Provincial tables 1901,1931 and 1951.

length of fifty years; two retained their status for thirty years whereas the remaining two tahsils of Muzaffarnagar and Amupshahr retained their positions for one decade each (tables LII and LIV). However the entry into this category in 1951 was fairly substantial. Four tahsils of Nakur, Hapur, Bulandshahr and Khurja increased their rural population substantially above the Upper Doab average and thus qualified for inclusion in the 'high' category in 1951. The position in the medium category was very even all through the fifty years. The two medium tahsils (Nakur and Bulandshahr) of 1901 continued in that position upto 1931 but in 1951 both condescended to high category and were replaced by Kairana and Ghaziabad - the new entrants to the medium category. Amongst the low category tahsils again the change was very little. Out of the five tahsils belonging to this class in 1901 three retained their status for full length and two continued in their position upto 1931. In 1951 these later two tahsils (Kairana and Khurja) shifted to the medium category. New entrant to the low category was the tahsil of Muzaffarnagar which qualified for this class in 1931 and retained it in 1951. This brief outline shows that the change in the rural character was relatively less amongst the very high and low category tahsils whereas it was comparatively more marked amongst the tahsils of the remaining two middle categories of rurality.

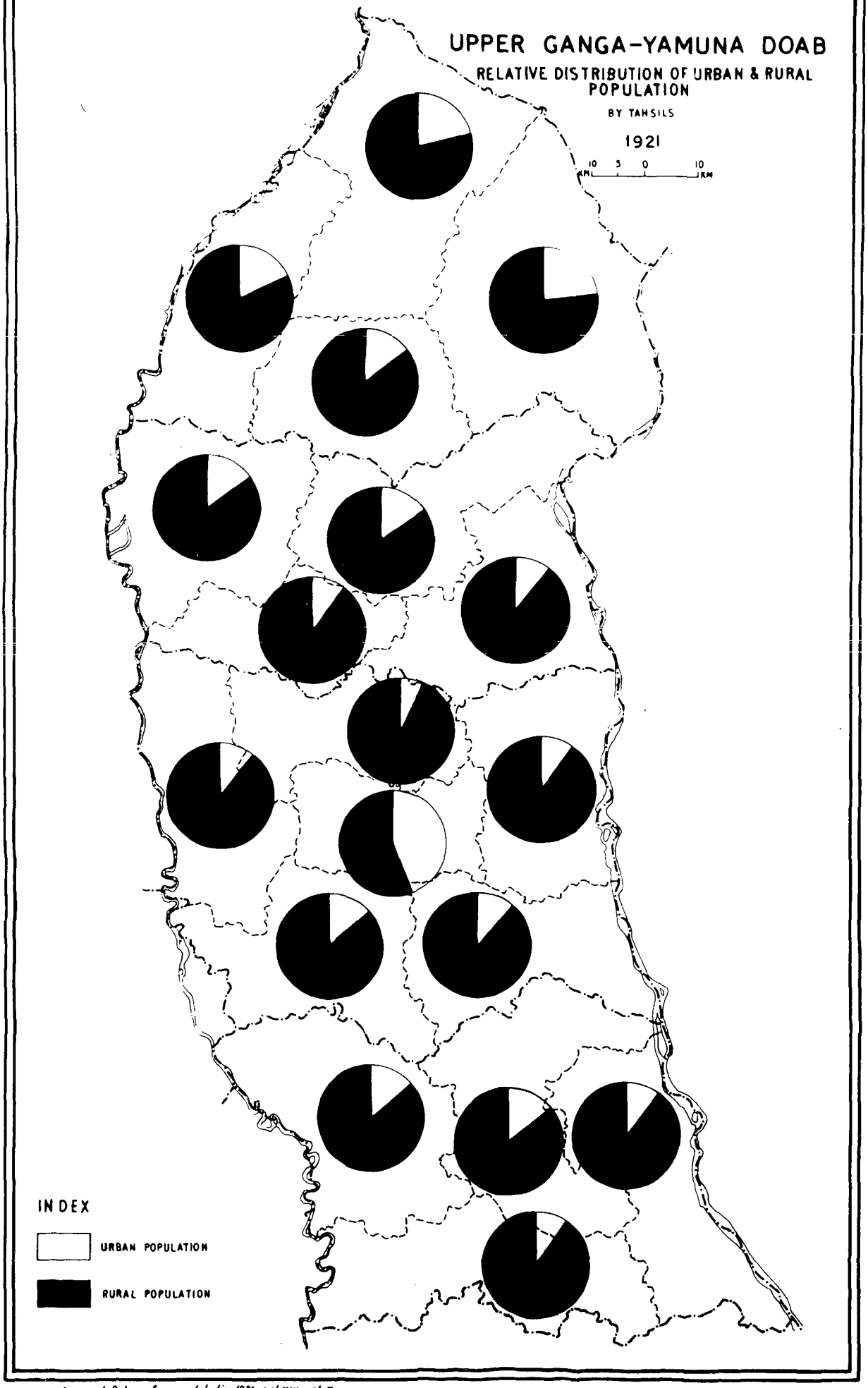
4. REGIONAL DISTRIBUTION

On the whole the rural population was rather evenly distributed amongst the various tahsils of the region. However, it will be noted from Figs. 36, 37, 38, 39, 40, 41 and 42 that the higher percentages of rural population were generally, found in the peripheral tahsils bordering either on the Yamuna or the Ganga River. On the contrary low and very low percentages of rural



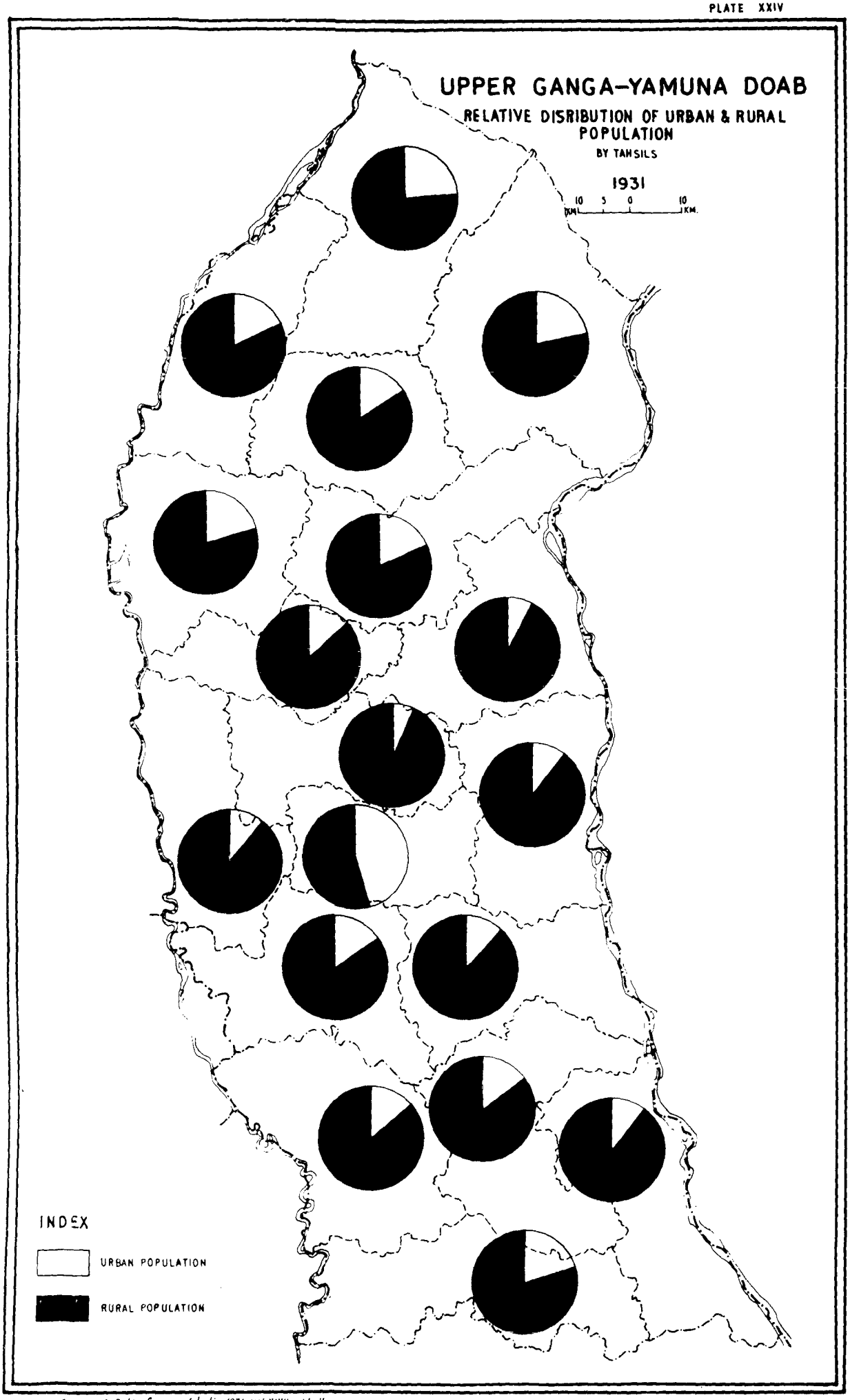
Source of Data : Census of India 1901, Vol. XVII-A pt.II ; 1911, Vol.XV, pt.II and Distt. Gaz. 1903

FIG. 37



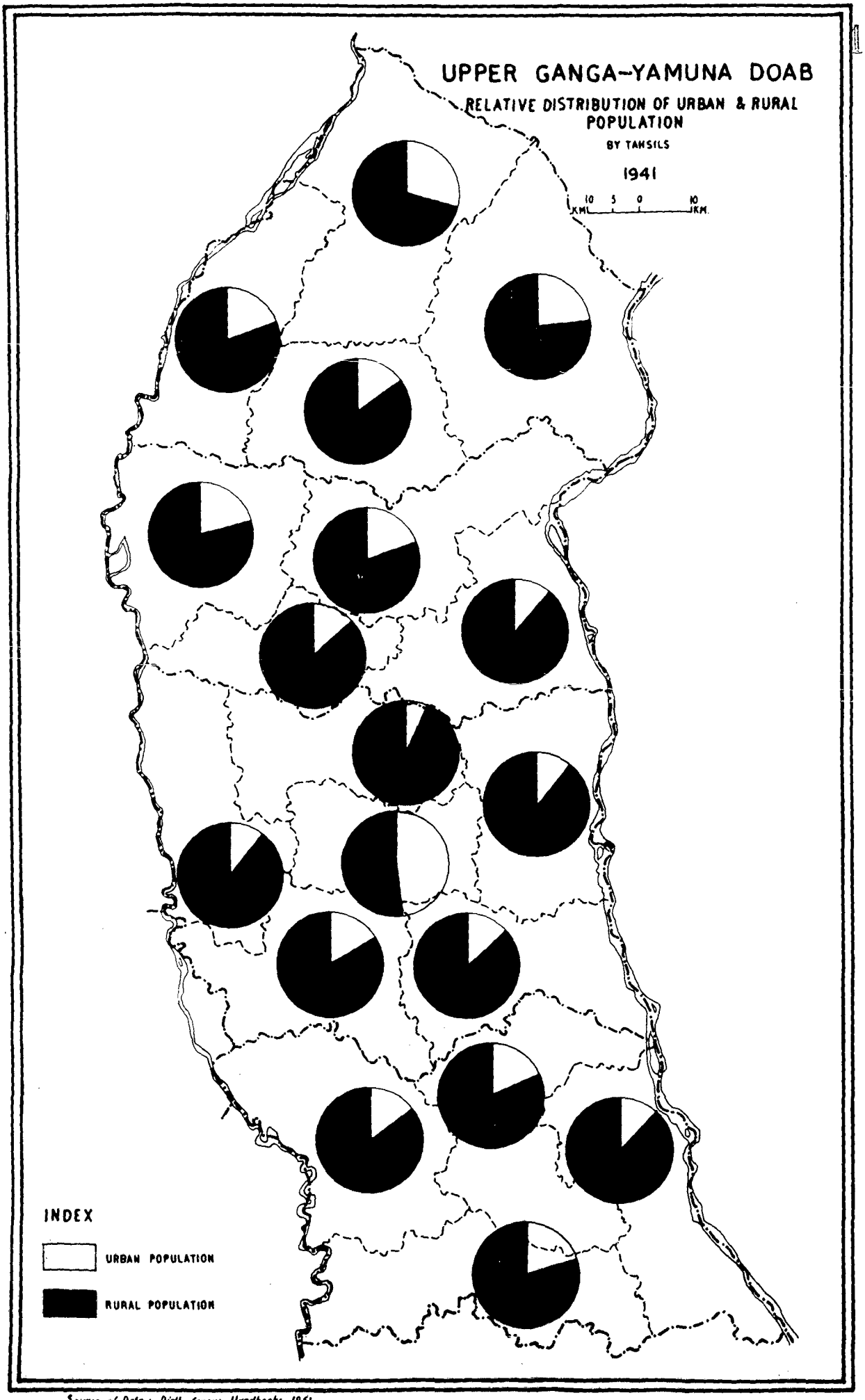
Source of Data : Census of India 1921, vol. XVI, pt. II

FIG. 39



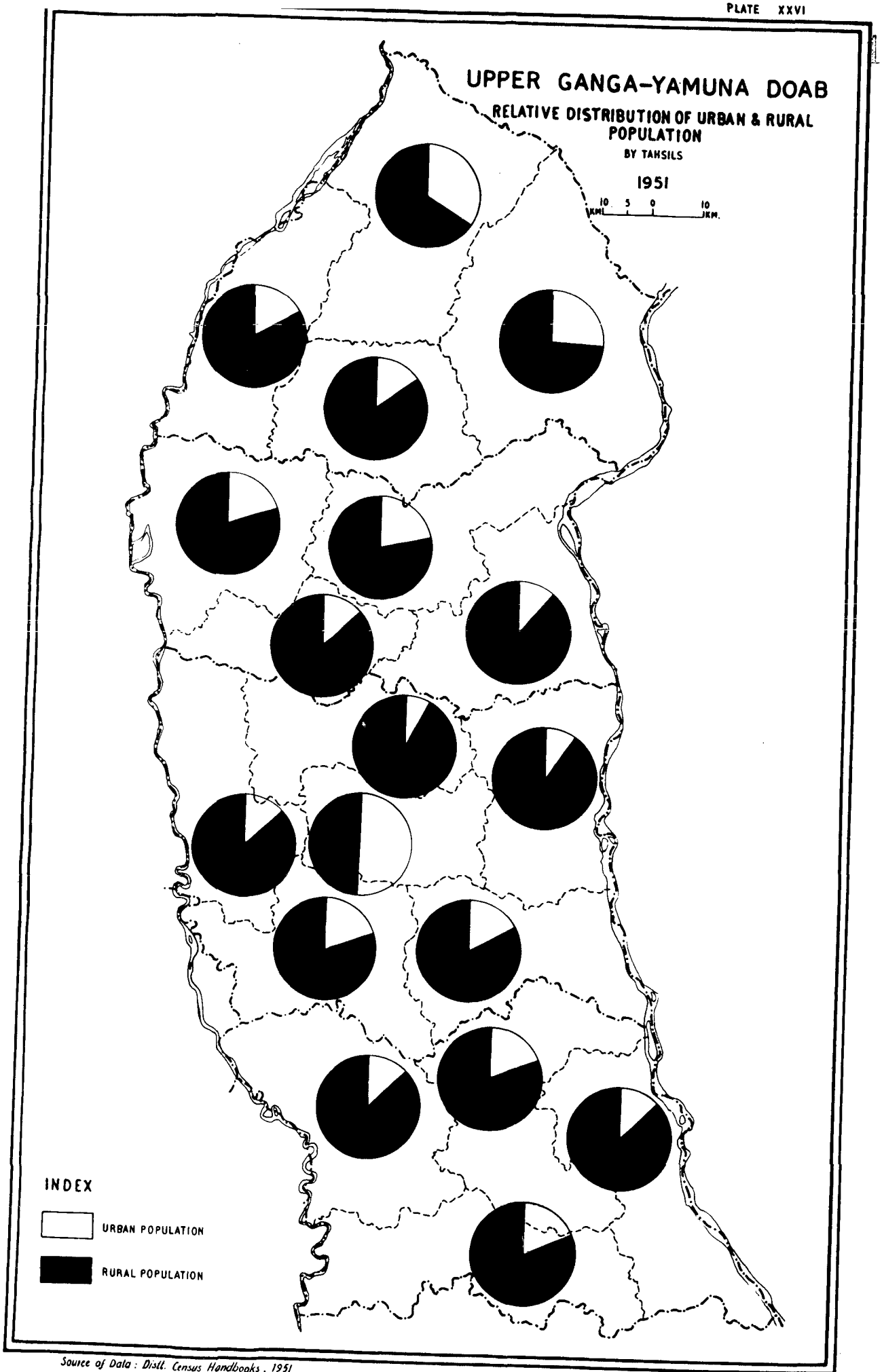
Source of Data : Census of India 1931, vol XVIII, pt. II

FIG. 40



Source of Data : Distt Census Handbooks, 1951

FIG. 41



Source of Data : Distt. Census Handbooks, 1951

FIG. 42

population were, in general, found in the middle tahsils containing either the district headquarters or a town of some special importance.

As it has been noted that very little change has taken place in the relative positions of the tahsils in respect of the degree of rurality during the fifty years it seems reasonably sufficient to confine the regional analysis to the year 1951 only.

On district level Saharanpur had the lowest rural percentage and Bulandshahr the highest in Upper Doab. Between the two central districts Meerut had a much lower percentage than that of the Muzaffarnagar district. Exactly identical position was in the year 1901(table LII). In 1951 Meerut district enjoyed the unique position of having its rural population very close to the average of the region. Saharanpur, and Bulandshahr and Muzaffarnagar on the other hand had an appreciably low and high percentages relative to the regions average respectively.

The regional contrasts in rural percentages were sharper on tahsil level. Both the highest and the lowest percentages of 92.11 and 49.47 were found in Meerut district in the adjoining tahsils of Sardhana and Meerut respectively. Fairly high rural percentages ranging between 87 and 90 were recorded in the tahsils of Budhana (87.23 per cent), Jansath (89.14 per cent) in Muzaffarnagar, in Baghpat (87.42 per cent) and Mawana (87.86 per cent) tahsils in Meerut and in Amupshahr(87.8 per cent) and Sikandarabad (87.35 per cent) in Bulandshahr. Although all these six tahsils are peripheral yet there does not seem to be any direct or distinct relation between the high rural percentages and the basic agricultural situation there. Some sharp contrasts in the rural percentages in certain tahsils are not in fact, due to any great disparity in the growth of rural population. From tables LI and LXI (Sec. II Urban Population)it will be noted that, relatively speaking, there was much greater uniformity in the rural

growth-rates than there was in the urban growth-rates. This relatively even growth of rural population is probably an indication of rather similarly even opportunities for the establishment of rural communities in almost all the tahsils and, therefore, some of the sharp contrasts in the rural percentage cannot possibly be atributed much to the basic state of agricultural opportuni-ties acting as stimulants or deterrents to the growth of rural population. The sharp contrasts are mainly a reflex of extraordinary expansion in the population of certain towns as shown in tables XXXV and XXXVI. Abnormal increase in urban population has specially been associated with the district towns in the sadar tahsils. This is one of the main reasons why the relatively low rural percentages were found in the middle tahsils of Upper Doab. The contrast between the percental variations in the urban population of the sadar town and the rural population of the sadar tahsil are set out in table IV. From the last column of ratios of the table it will be seen that even the lowest amount of excess of urban relative to rural population was in the ratio of 3:1. The regional pattern of distribution of the rural population in the region was, therefore, primarily shaped by the relative quantum of increase in the urban centres of the tahsils.

TABLE LV

PERCENTAL VARIATION IN THE URBAN POPULATION OF DISTRICT HEADQUARTERS AND THE RURAL POPULATION OF THE SADAR TAHSILS, 1901-1951

Tahsil/Town	Percental variation 1901-1951 in Urban Population	Rural Population	Ratio of Variation
1	2	3	4
Saharanpur	+ 124. 0	+ 9.76	1 : 12.7
Muzaffarnagar	+ 173. 9	+39.36	1 : 4.4
Meerut	+ 96. 7	+10.85	1 : 8.9
Bulandshahr	+ 97. 7	+32.47	1 : 3.0

S O U R C E : (1) For urban population: Distt. Census Handbooks, 1951
(2) For rural population: Distt. Census Handbooks and Census of India, 1901 U.P. Provincial Tables.

5. DISTRIBUTION BY SIZE OF VILLAGES

The villages of the Upper Doab districts are of comparatively large size than those of the Eastern, Central or Himalayan districts of the State. Table LVI shows the number of villages of different sizes in each tahsil and district of Upper Doab and also in other regions of U.P. It will be seen from the table that the larger villages were not only more numerous in the districtsof Upper Doab but also that the percentage of the rural population residing in the large size villages was conspicuously larger in this region than elsewhere in the State. The table indicates that the rural population of Upper Doab living in the villages of 1,000 to 2,000 persons was more than

three times its corresponding proportion in the State, four times that in the Eastern plains of the State and hundred times that in the Himalayan region. The contrast was still sharper in respect of the villages having a population between 2,000 and 5,000 persons. The percentage of the Upper Doab rural population living in these villages was almost twelve times that of the State average and fifteen and eleven times of the percentages in the Eastern and Central plains respectively, whereas the Himalayan region stood in no comparison (0.1 per cent against 28.4 per cent). On the other hand the percentage in small size villages of under 500 persons in Upper Doab was only about 16 per cent of the State percentage and only about 11 per cent of the percentage in the Himalayan region.

The predominance of large size villages is a historical fact[6] and is indicative of high degree of compactness in rural settlements. As a matter of fact the villages of Upper Doab in general and of Muzaffarnagar and Meerut districts in particular are principally composed of a single nucleated and compact site. The compactness gradually decreases slightly towards south of Meerut district. Similarly the compactness is generally greater and more numerous in the peripheral areas than in the middle sections of the region.[7] This fact is conveyed by tahsil-wise percental distribution of rural population among the villages of various sizes. (table LVI).

In Saharanpur district Roorkee had more than 60 per cent of its rural population living in villages of medium and large size of 1,000 to 2,000 and more than 2,000 persons respectively. In the large villages alone the proportion was 20.2 per cent: 4 per cent higher than the percentage in the small villages of less than 500 persons. Similarly more than half of the rural

6. Ahmed, E. Rural Settlement Types in the Uttar Pradesh, Annals of the Association of Americation Geographers, Vol.XLII, Sept.1952,No.3,pp.223-246.

TABLE LVI

DISTRIBUTION OF VILLAGES OF VARIOUS SIZES
IN THE UPPER GANGA-YAMUNA DOAB AND ITS DISTRICTS AND TAHSILS
1951

	Number and Percentage of Villages with Population						
	Over 10,000	5000 to 10,000	2000 to 5,000	1000 to 2000	500 to 1000	Less than 500	Total
	1	2	3	4	5	6	7
Deoband	-	1 (2. 4)	12(14. 2)	58(34. 3)	91(28. 8)	159(20. 3)	321 100.0
Nakur	-	-	4(5. 6)	38(26. 1)	104(37. 5)	247(30. 8)	393 100.0
Roorkee	-	-	22(20. 2)	81(37. 5)	109(26. 0)	205(16. 3)	417 100.0
Saharanpur	-	1 (1. 9)	7(6. 8)	70(31. 4)	163(38. 1)	254(21. 8)	495 100.0
SAHARANPUR DISTT.	-	2 (1. 1)	45(12. 3)	247(32. 8)	267(32. 3)	865(21. 5)	1,626 100.0
Budhana	-	6 (17. 5)	33(40. 9)	44(26.8)	30(11. 9)	25(2. 9)	138 100.0
Jansath	-	1 (2. 8)	31(35. 3)	62(34.7)	69(20. 3)	81(6. 9)	244 100.0
Kairana	-	3 (6. 7)	32(38. 7)	49(26. 3)	66(18. 1)	104(10. 2)	254 100.0
Muzaffarnagar	-	2 (4. 3)	36(37. 1)	64(32. 7)	70(18. 5)	98(7. 4)	270 100.0
MUZAFFARNAGAR DISTT.	-	12 (7. 6)	132(37. 9)	219(30. 2)	235(17. 3)	308(7. 0)	906 100.0

contd.

contd.

	1	2	3	4	5	6	7
Baghpat	-	7(11. 8)	60(51. 3)	58(23.2)	56(11.3)	31(2.40)	212 100.0
Ghaziabad	-	2(3. 1)	49(41. 6)	66(26.9)	93(19.6)	96(8. 8)	306 100.0
Hapur	-	-	35(30. 9)	89(39.9)	95(23.5)	71(5. 7)	290 100.0
Meerut	-	2(4. 7)	28(29. 9)	70(39.9)	62(19.3)	49(6. 2)	211 100.0
Mawana	-	4(4. 3)	19(22. 9)	82(46.5)	56(17.2)	97(9. 1)	258 100.0
Sardhana	-	7(15. 4)	42(42. 4)	46(23.3)	52(13.6)	45(5.3)	192 100.0
MEERUT DISTT.	-	22(7. 0)	233(37.6)	411(32.3)	414(17.1)	389(6. 0)	1469 100.0
Bulandshahr	-	1(1. 4)	31(23. 2)	103(38.5)	138(27.8)	111(9. 1)	385 100.0
Anupshahr	-	-	29(24. 6)	91(36.3)	137(28.5)	128(10. 6)	385 100.0
Khurja	-	-	19(19. 0)	78(35.9)	122(30.6)	131(14. 5)	350 100.0
Sikandarabad	-	-	16(15. 7)	77(37.5)	103(26.6)	209(20. 2)	405 100.0
BULANDSHAHR DISTT.	-	1(0. 8)	95(20. 8)	349(37.1)	500(28.2)	579(13. 1)	1525 100.0
UPPER G.Y.DOAB	-	37(4. 4)	505(28. 4)	1226(33.2)	1616(23.0)	214(11. 0)	5526 100.0
U.P.	1	120(0. 1)	2675(2.4)	10261(9.2)	23208(20.8)	75457(67. 5)	111722 100.0
Himalayan Reg-ion.	-	1	15(0.1)	39(0.3)	363(2.4)	14425(97. 2)	14843 100.0
Eastern Region	1	93(0. 1)	661(1.9)	2966(8.4)	7478(21.2)	24183(68. 4)	35322 100.0
Central Plains	-	16(0. 1)	644(2.6)	2800(11.2)	6289(25.3)	15121(60. 8)	24870 100.0

Note: Figures in brackets indicate percentages of the total rural population.

S O U R C E : Calculations based on tables A-III and A-IV of District Census Handbooks of Saharanpur, Muzaffarnagar, Meerut and Bulandshahr; and Census of India 1951, Vol.II U.P. Part I-A-Report p.116.

population of Deoband lived in medium and large size villages. About 2.4 per cent lived in very large size villages having more than 5,000 persons. In the Saharanpur tahsil the percentage in large and medium size villages was relatively less being about 40 per cent which included a percentage of about two living in very large villages. This reduction in the proportion of large villages may probably be attributed to the mountanous terrain of the northern parganas of the tahsil. Nakur Tahsil, however, stood out as exceptional for having a relatively high percentage of its rural population living in low medium and small size villages of 500 to 1,000 and under 500 persons respectively. These two classes of villages combinedly accounted for more than 68 per cent of the tahsil's total rural population. The tahsil did not have any village of really big size whereas the proportion of the population living in large villages was as low as 5.6 per cent. This relatively small proportion of large size villages might have in all probability been due to the highly precarious agricultural situation, and small increase in population. The growth of population is one of the factors which affect the quantum of large size village population. It has already been noted

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7. A detailed analysis of the settlement types is not relevant to the present work. It may, however, be noted here that the factor of safety and security both against the vagaries of the rain and rivers and the in roads from the west has been the most potent single cause of general nucleation and compactness in the villages. Small average annual rainfall necessitates irrigation but a lower water table (relative to that of the eastern sections of the State) does not make the proposition of digging individual wells for irrigation as easily workable as it is in the eastern districts. Besides, the districts of the Upper Doab have been rather constantly vulnerable to attacks from outside. Most of the historic wars, right from the time of Mahabharat to the second battle of Panipat, have been fought over this area. These circumstances promoted a sense of the need for close practical co-operation and pooling of efforts amongst the peasants of the old and thus led to the development of compacted settlements which despite the change in the situation of security have endured down to the present under the momentum of history and tradition. Though the historical factors have lost much of their potency the geographical factors of terrain, rain and river spates are still holding on as strongly as ever.

in the earlier chapters that the population of certain tahsils has increased considerably during the second quarter of the present century and consequently quite a good number of small village have passed into higher classes and have caused an increase in the percentage of the big size villages. But the increase in the population of Nakur was not as rapid and great and the swelling of villages to higher classes of size was, therefore, very limited, if at all it was there, and the tahsil thus remained a small village tahsil even upto 1951.

Muzaffarnagar alongside with Meerut was highly prominent for having very low proportion of only 7.0 per cent living in small villages with a population of less than 500. Budhana tahsil had the lowest percentage in the low size villages amongst the tahsils of Muzaffarnagar district. Only 2.9 per cent of the tahsil's population lived in villages of under 500 persons. This percentage was second lowest in the whole of the Upper Doab region. On the other side of the scale too the tahsil had the second highest percentage of population living in villages with more than 1,000 persons its proportion of 85.2 per cent was only slightly surpassed by Baghpat with a percentage of 86.3 living in medium and large size villages. However, the tahsil had the undisputed and clear distinction of having the highest percentage of rural population living in villages with more than 5,000 persons. The remaining three tahsils of Kairana, Jansath, and Muzaffarnagar did not differ much in the percentage of people living in the villages of higher classes. Muzaffarnagar had a percentage of 74.1 in the three upper size of the villages whereas the corresponding percentages in Jansath and Kairana were 72.8 and 71.7 respec--tively. Some reference to the probable causes of high incidence of compact villages in the region has already been made, However, some special circumstances related to the tahsils of this district may also briefly be

noted here. From the details of the drainage and general topographic features given in the 1st part it is evident that the Jansath tahsil, for instance, has long been exposed to the caprice of the Ganga and the Solani. From the mid-nineteenth century the Solani has extended its course from Saharanpur into the north-eastern parts of Muzaffarnagar and Jansath tahsils. The river now follows an uncertain meandering course. The area is thus highly vulnerable to sudden floods and or change of course of the river. The changes in the course of the Ganga were also not a feature of only the remote past. The great changes in the course of the river which caused the formation of the broad khadir tract occurred, according to Nevill, about 1400 A.D. A more recent change probably took place in the early seventeenth century during the reign of Shahjahan. Rather similar situation is to be found in the western parts of the tahsils of Kairana and Budhana. The tract is traversed by the rivers kirsani and karha which cut it off from the main part of the tahsils. The area lies in a depression and is miserably exposed to the floods and vagaries of the rivers.[8] Besides, this was also the tract where many battles including the last battle of Panipat were fought. In view of these circumstances and other factors related to water table, tenancy system and olden caste, economic, and professional heirarchy it is but most expected that the region should have been abounding in large size compact villages.

In 1951 the whole of the Meerut district stood as most predominant in respect of large and compact villages. The district had almost 77 per cent of its rural population living in medium and large villages whereas only 6 per cent were living in small villages of under 500 persons. An ordinary Meerut village is as a rule square, flat and compact and is more often

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8. For further details see the District Gazetteer of Muzaffarnagar Lucknow, 1922.

than not provided with ramifications. The high percentage of large villages especially in the tahsils of Baghpat and Sardhana might also be attributed to the disturbed conditions that prevailed just before and during the early period of British rule. So strong was the impact of these conditions that " the houses were closely packed together into a central site, (the nucleus) the outer walls generally adjoining, so that the villages often presented the appearance of a walled and fortified enclosure, as for instance, Abdullahp near Meerut and Baleni on the Hindan."[9]

The tahsils of Baghpat and Sardhana had the highest percentages of rura people living in big and medium size villages. Baghpat tahsil led the whole Upper Doab with a percentage of 86.3 in villages with above 1,000 population whereas the percentage of 2.4 in small villages of under 500 was the lowest. The incidence of large villages was especially high in the north-western section of the tahsil in the parganas of Chhaprauli, Kotana and Baraut. Next in order of high incidence of large villages was the tahsil of Sardhana where such villages (above 1,000 population) accounted for 81.1 per cent against 5.3 per cent accounted for by the small villages with under 500. In Sardhana, too, the western pargana of Barnava was outstanding for relatively high percentage in the big and medium size villages. It may be noted that there was a continuous belt of parganas from Bidauli and Jhinjhana in Muzaffarnag to the Parganas of Baraut and Burnawa in Meerut which contained both the largest number of big size villages and the highest percentage of the rural people living in villages with above 1,000 population.

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9. Nevill, H.R., The District Gazetteer of Meerut, 1922, p.103.

The percentage of rural population living in villages with over 1,000 persons in the remaining four tahsils of Meerut, Mawana, Ghaziabad and Hapur ranged between 70 and 75. Meerut tahsil had a relatively high percentage of 74.5 and was closely followed by Mawana tahsil with a percentage of 73.7. Ghaziabad tahsil stood in the third place with 71.6 per cent and was again closely followed by Hapur tahsil with 70.8 per cent.

These tahsils thus formed two pairs - one pair closing on 75 per cent the other on 70 per cent. The circumstances that were operative in Meerut were almost identical to those noted in connection with its contiguous tahsil of Sardhana. However, during the later period of British rule when the conditions became stabilized the villages showed a tendency to outgrow the bounds of the earlier ramifications or Qilas and a semi-dispersion began to set in especially in the Meerut tahsil. Besides this, some of the earlier larger villages assumed somewhat urban character and lessened their earlier rural nature under the influence of the fast growing city of Meerut and thus qualified for promotion to the urban category. This seems to be the plausible explanation of relatively low frequency and percentage of large size villages and the population thereof in the sadar tahsil of the district.

Mawana bordering on the Ganga khadir had problems quite similar to those of Jansath in the north. The khadir being a low-lying tract is generally exposed to floods by seasonal rivers and streams and, as such, the villages were usually, and as a matter of selection and preference, perched on rising grounds or some promontaries. This was exactly the case in Mawana where both protection against sudden swelling of local seasonal streams and the drainage of the undesired water was a problem of priority. The high perched villages could but only be compact and also of fairly large size as there may not possibly be an indefinite number of favourable sites for

village development. Such villages, generally suffixed with Qila, formed a special feature of the rural population of Kithore pargana of the tahsil.

Hapur and Ghaziabad tahsils, on the other hand, had the highest percentag of rural population in the low-medium and small size villages with under 1,000 persons among the four tahsils of the district. In Hapur 23.5 per cent of the rural population lived in villages of 500 to 1,000 and 5.7 per cent in villages of under 500 persons as compared with Ghaziabad's respective percentages of 19.6 and 8.8. However, in these tahsils both the number of upper grade villages and their percentage of rural population was by no means low. As noted above these percentages namely 70.8 and 71.6 were appreciably above the Upper Doab average of 66 per cent and about six times higher than the State average. The noteworthy point about these tahsils is that they had the largest number of villages of the size category of 2,000 to 5,000. According to the 1951 census no less than 51.3 per cent of Ghaziabad's rural population lived in villages of this class. Hapur however, stood in the third place in respect of this category of villages being a close second to Sardhana tahsil with a percentage of 41.6.

In the southern district of Bulandshahr the predominance of the large villages was relatively less marked. The district as a whole had an average of 58.6 per cent of its rural population residing in villages with 1,000 to 5,000 persons. Though this percentage was considerably higher than the corresponding average percentage in Saharanpur district it was nevertheless distinctly below the average of not only the Muzaffarnagar and Meerut districts but also of the Upper Doab taken as a whole. The table IV.I shows that the large size villages gradually decreased both in number and the percentage

of population from north to south and east to west within the district of Bulandshahr - the north-eastern tahsil had the highest percentage of 63.1 of its rural population living in the villages of medium and large size whereas it had the lowest percentage of only 9.1 in the small villages of under 500. Besides, the tahsil contained the only village of very large size of the district with a population of more than 5,000 persons. However, the most predominant class in this tahsil as also in the remaining other tahsils was of medium size with 1,000 to 2,000 persons, the percentage in this class ranged between 38.5 (in Bulandshahr tahsil) and 35.9 (in Khurja tahsil). Anupshahr tahsil with 60.9 per cent of the rural population living in villages of 1,000 to 5,000 occupied the second position in the district. The tahsils of Khurja and Sikandarabad with percentages of 54.9 and 53.2 respectively followed Sikandarabad in that order.

These intradistrict and inter-tahsil variations were probably due to differential rates of growth of general and rural populations discussed in earlier chapters. Because of relatively high rate of increase in the parganas of Bulandshahr and Anupshahr tahsils the villages which got promotion to upper classes of size were relatively more numerous in these tahsils than they were in Sikandarabad and Khurja tahsils. Besides, the problems of drainage and the effect of terrain in the eastern peripheral areas of the district have been rathe similar to those noted in connection with the parganas of Mawana tahsil of Meerut in the north. These finer differences aside, all the tahsils of the district had almost identical situation of security, tenancy and social systems and, therefore, did not differ much in their share of the villages of different size categories.

The profile that emerges from the above discussion is that the large size villages and the percentage of population therein increased southward from the

submontane tract in the Saharanpur district, attained a maximum in the central part of Upper Doab just to decline southwards therefrom. Similarly the incidence of highly compact and large size villages were relatively more numerous in the Khadir parganas than in the bhangar or the upland parganas of the interior of the Upper Doab region.

CHAPTER VI

SECTION II

URBAN POPULATION

1. GROWTH AND DISTRIBUTION (GENERAL)

The percentage of urban population of Upper Doab has varied between 17 and 21 and the number of towns has varied between 72 and 80 during the fifty years from 1901 to 1951. Though these percentages of urban population were low compared with those of many of the modern countries yet they were appreciably higher than corresponding State percentages which have ranged between 11 and 14 during the same period. In 1901, 795,970 persons or 17.2 per cent of Upper Doab's total population were recorded living in 72 towns. In 1951, on the other hand, the number of persons living in towns was 1,275,879 amounting to 20.1 per cent of the total population. The number of towns returned in the 1951 census was 80. In contrast to this the State of U.P. had 5,396,317 persons or 11.1 per cent of the total population living in 459 towns in 1901 whereas in 1951 it had 8,625,699 persons or 13.6 per cent of the total population living in 486 towns. These percentages indicate that the absolute gain in the urban population of Upper Doab during fifty years was 479,909 persons or 60.29 per cent of the urban population of 1901. The gain in the State's urban population during the same period was 3,229,382 persons or 59.84 per cent of the 1901 total. The absolute and percental variations of the urban population of Upper Doab and U.P. are set out in table LVII. From this table it will be seen that during the first two decades the percentage or urban population in Upper Doab

remained almost stationary. Though in fact there occurred a slight increase in the percentage at the end of the second decade but that was very nominal being only about 0.2 per cent. The corresponding increase in the State percentage was relatively more appreciable being about 0.4 per cent. After 1921 the urban population continued to grow at a steady and accelrating rate.

TABLE LVII
URBAN POPULATION OF UPPER DOAB AND U.P.
ABSOLUTE AND PERCENT 1901-1951

Region		1901	1911	1921	1931	1941	1951
1	2	3	4	5	6	7	8
UPPER DOAB	Absolute	795,970	715,809	703,708	806,675	1,013,786	1275879
	Percent	17.2	16.1	16.3	17.1	19.0	20.1
	Number of towns	72	72	70	70	72	80
U.P.	Absolute	5,396,317	4,918,039	4,936,998	5,568,673	7,020,270	8625699
	Percent	11.1	10.2	10.6	11.2	12.4	13.6
	Number of towns	459	423	446	428	456	467

Note: Cantonments have been treated as separate towns.

S O U R C E : Calculations are based on data from:

a) Census of India 1901,Vol.XVI-A,N.-W.P and Oudh, Part II, Imperial Tables,pp.14-25.
b) " " 1911,Vol.XV,U.P. of Agra and Oudh,Part II Imperial Tables, pp.14-27.
c) " " 1921,Vol.XVI,U.P. of Agra and Oudh, Part II Imperial Tables, pp.14-27.
d) " " 1931,Vol.XVIII, U.P. of Agra and Oudh, Part II Imperial Tables,pp.16-30
e) " " 1941,Vol.V,U.P. Tables,pp.34-55.
f) " " 1951, Vol.II, U.P.,Part II-A, General Population Tables,pp.37-84.

The acceleration in the growth of the urban population of the State was almost the same as that of the Upper Doab. The position of Upper Doab in respect of urban population among the various divisions of the State is shown in table XLVII (Section I-rural population). It will be seen from the table that Upper Doab's 20.1 per cent in 1951 was only 0.1 per cent less than the highest percentage of 20.2 recorded in the Rohilkhand division.

A comparison of table LVIII with table XLIX reveals that the recovery from the decline of the first decade was quicker in the urban than in the

TABLE LVIII
INTERCENSAL VARIATION AND MEAN DECENNIAL GROWTH-RATE OF URBAN POPULATION BY DISTRICTS - 1901-1951

District/Year	Population	Intercensal variation		Mean decennial growth rate
		Absolute	Percental	
1	2	3	4	5
SAHARANPUR				
1901	201,634	-	-	-
1911	182,109	- 19525	- 9.6	- 10.23
1921	179,767	- 2342	- 1.3	- 1.29
1931	208,504	28737	15.9	- 14.80
1941	267,306	45,270	21.3	23.06
1951	337,551	70,245	26.7	23.23
MUZAFFARNAGAR				
1901	114,678			
1911	113,355	-21,323	-15.8	-17.19
1921	113,599	244	0.2	0.21
1931	134,710	21,111	18.5	17.00
1941	174,759	40,049	29.7	25.88
1951	205,216	30,457	17.4	16.03
MEERUT				
1901	274,975			
1911	253,678	- 21,297	- 7.7	- 8.05
1921	257,126	3,448	1.4	1.35
1931	288,593	31,467	12.2	11.53
1941	361,365	74,269	25.8	22.40
1951	499,676	138,311	38.2	32.12
BULANDSHAHR				
1901	184,683			
1911	166,667	-18,016	- 9.7	-10.25
1921	153,216	-13,451	- 8.0	- 8.47
1931	174,868	21,652	14.2	13.26
1941	210,356	35,486	20.3	18.42
1951	233,436	23,080	11.0	10.40

S O U R C E : Calculations based on data from Imperial and Provincial Tables, Census of India, U.P.1901,1911,1921,1931,1941 and 1951.

rural population. Though in Saharanpur and Bulandshahr the urban population continued to decline upto 1921 but in the remaining two districts the decline was arrested a decade earlier and the population recorded an increase in 1921. On the whole the general patternof variation of urban population was quite different from that of the rural population. From Fig.31 it will be seen that the growth of urban population in the districts of Saharanpur and Meerut belonged to the sixth category of accelerated increase of Kohn's growth categories[10] whereas in the remaining two district of Muzaffarnagar and Bulandshahr the growth belonged to the fifth category of decelerated increase. In these latter districts the peak was reached in 1941 and then the growth curve veered downwards. On the other hand, as has already been noted, the rural growth curve was of the decelerated increase category in three districts and of a special category of undulated growth in one district.[11]

A second difference evident from the comparison of Figs.32 and 43 and also from Fig.31 is that the rate of increase of urban population was substantially higher than that of the rural population. The contrast in the rates of urban and rural growths became sharper after 1931. During the thirties and forties the urban growth in Saharanpur was more than double of the corresponding rural growths. Similarly in Meerut the increase percentage of urban population during these decades was one and a - half times and more than double of the growth percentage of rural population. In Muzaffarnagar also the urban growth was relatively high. In 1941 - the peak year of urban population in the district - the increase of urban population was very nearly double of the corresponding growth of the rural

10. Kohn. H.F. " Population Trends in the United States Since 1940". Ann. of the Ass. of Am. Geog.Vol.28.1938.

11. This category may be had by a horizontal pairing of Kohn's second category of decline with subsequent increase.

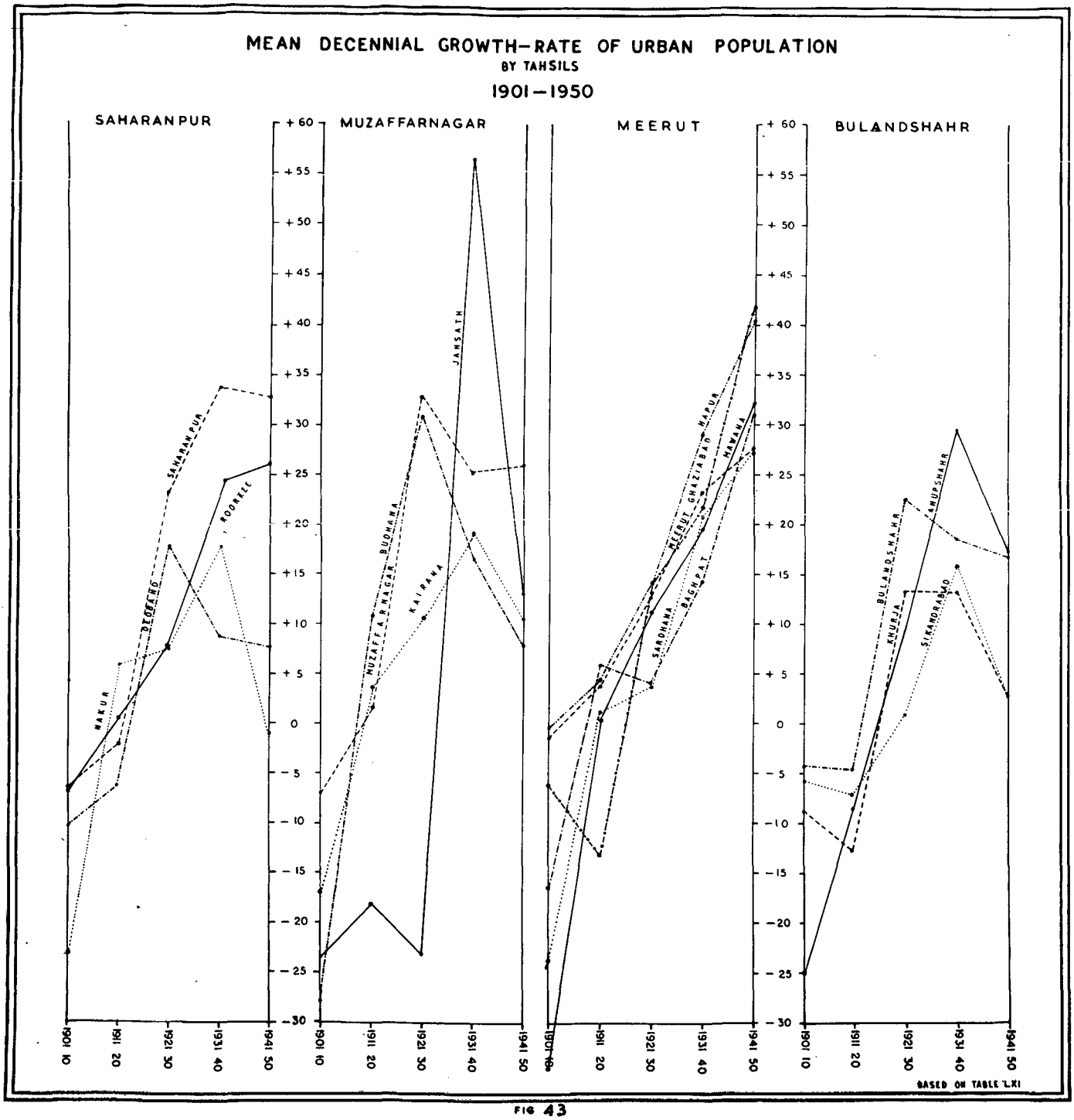
MEAN DECENNIAL GROWTH-RATE OF URBAN POPULATION
BY TAHSILS
1901–1950
SAHARANPUR
MUZAFFARNAGAR
MEERUT
BULANDSHAHR
+60
+55
+50
+45
+40
+35
+30
+25
+20
+15
+10
+5
0
-5
-10
-15
-20
-25
-30
1901 10
1911 20
1921 30
1931 40
1941 50
HAKUR
DEOBAND
SAHARANPUR
KOORKEE
JANSATH
BUDHANA
MUZAFFARNAGAR
KAIRANA
HAPUR
GHAZIABAD
MEERUT
HAPUR
SARDHANA
BAGHPAT
MAWANA
BULANDSHAHR
KHURJA
ANUPSHAHR
SIKANDRABAD
BASED ON TABLE LXI

FIG 43

population but the urban percentage subsequently reduced to become only one and a - quarter times of the rural percentage in 1951. Bulandshahr district, however, could not maintain similarly high urban rates. After leading the rural rates by 2.6 and 1.3 times during the third and fourth decade respectively the urban rate fell below the rural rate by about 25 per cent of the latter in the fifth decade. Thus, if the unqualified total of the population of towns is any measure of urbanization, the Meerut district was the most urbanized and the Bulandshahr the least in the Upper Doab region. Similarly the growth of urbanization was greatest in Meerut and least in Bulandshahr.

This latter fact is also evident from the mean decennial growth-rates given in the last column of table LVIII. In Meerut and Saharanpur the growth-rates were 32.12 and 23.23 per cent in the fifth decade compared with 16.03 and 10.4 per cent in Muzaffarnagar and Bulandshahr respectively during the same period. These interdistrict contrasts are set out in Fig.31. Incidentally it may also be noted that the urban growth-rates of Saharanpur and Meerut were substantially higher than the average urban growth-rate of the State during the 1941-50 decade.

Another point of note is that amongst the towns of the region the growth generally varied in direct proportion with the size of the town. A comparative study of the six maps[12] (Figs.44-49) showing the decennial variation in the size of the towns of various classes reveals that while the towns of lower classes generally did not increase much in their size the town

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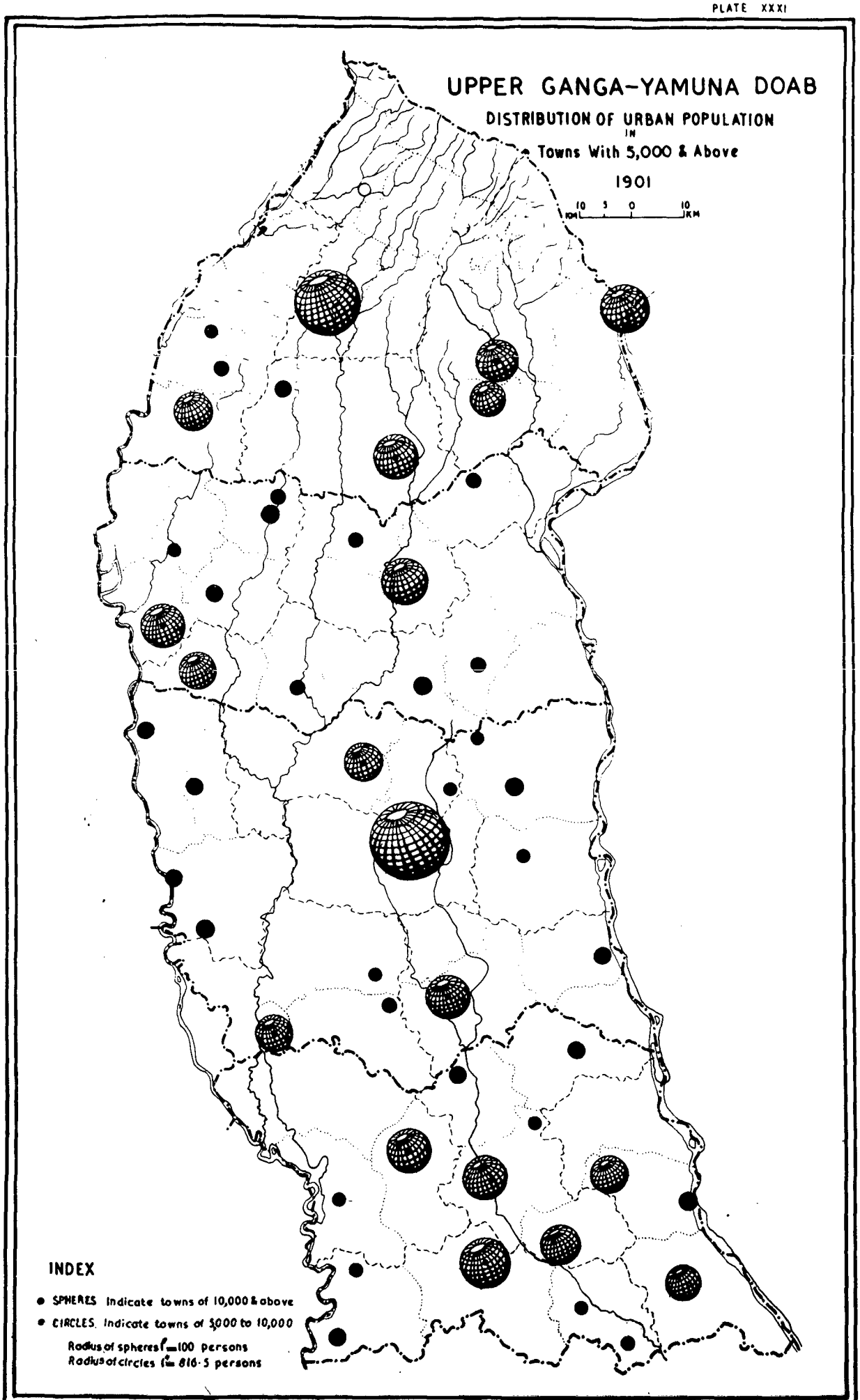
12. These maps have been prepared on the basis of a new statistical method. The details of the method and the formula used are given in Appendix-I.

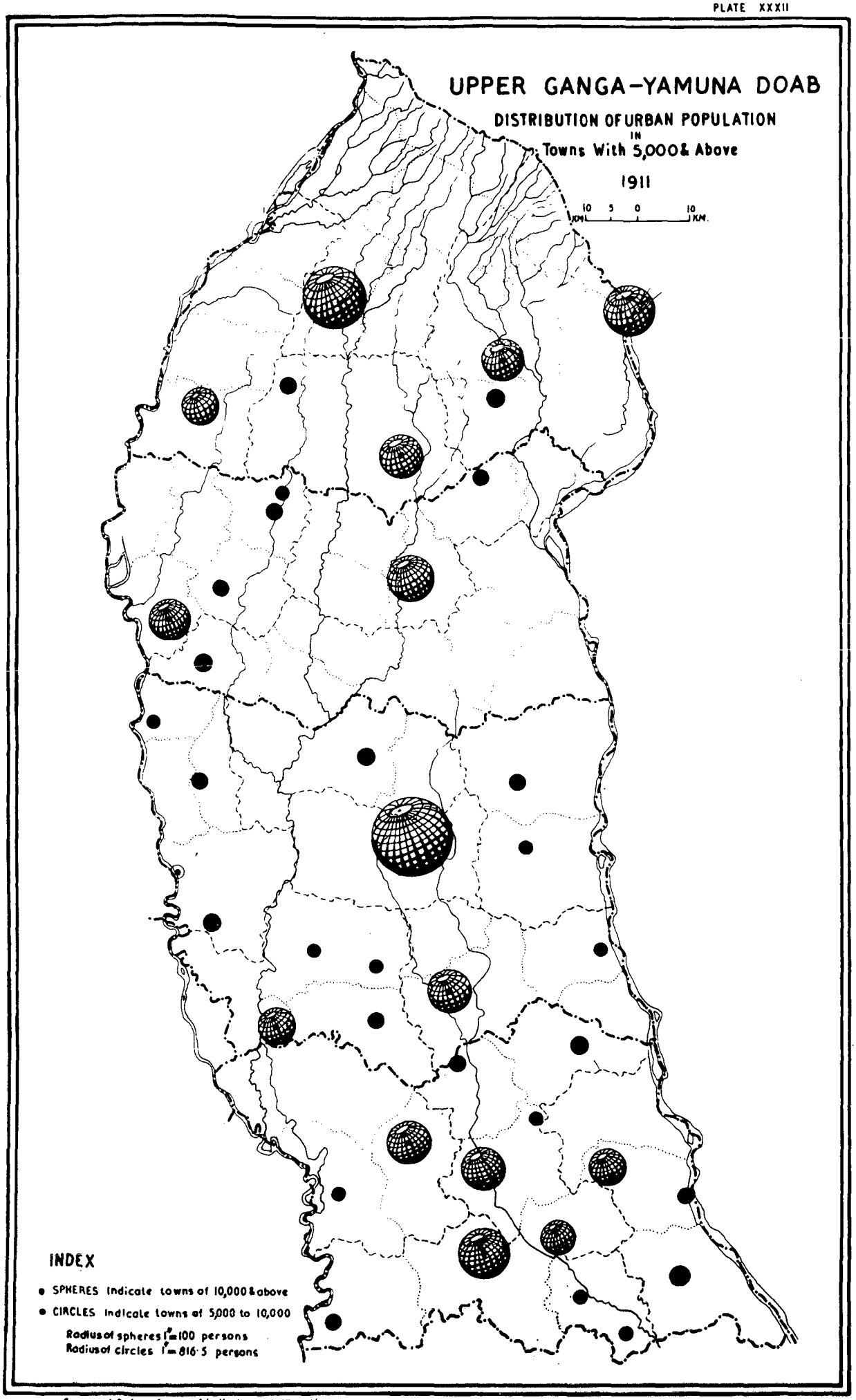
PLATE XXXI



Source of Data : Census of India 1901, Vol. XVII-A, pt. II

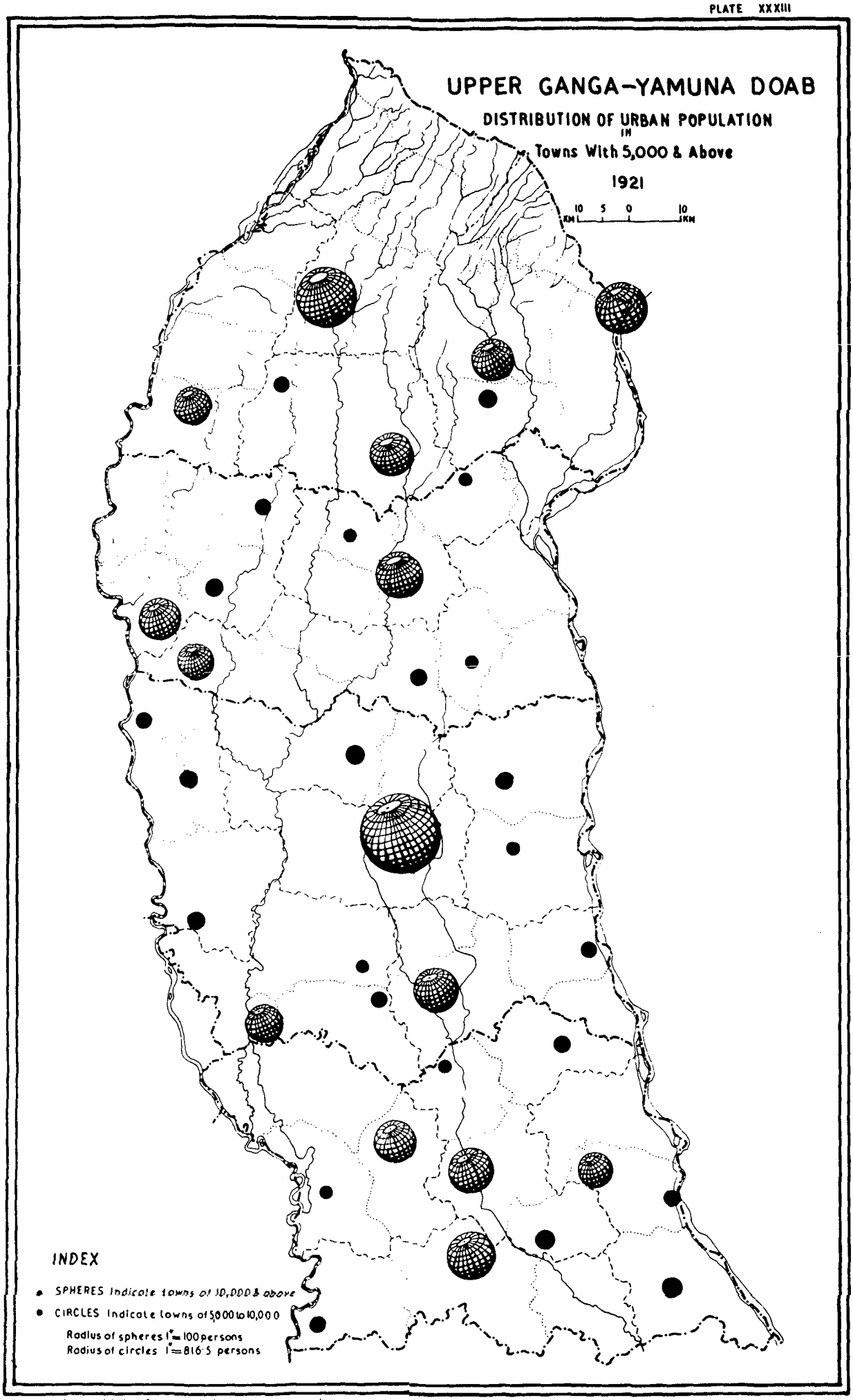
FIG. 44

PLATE XXXII



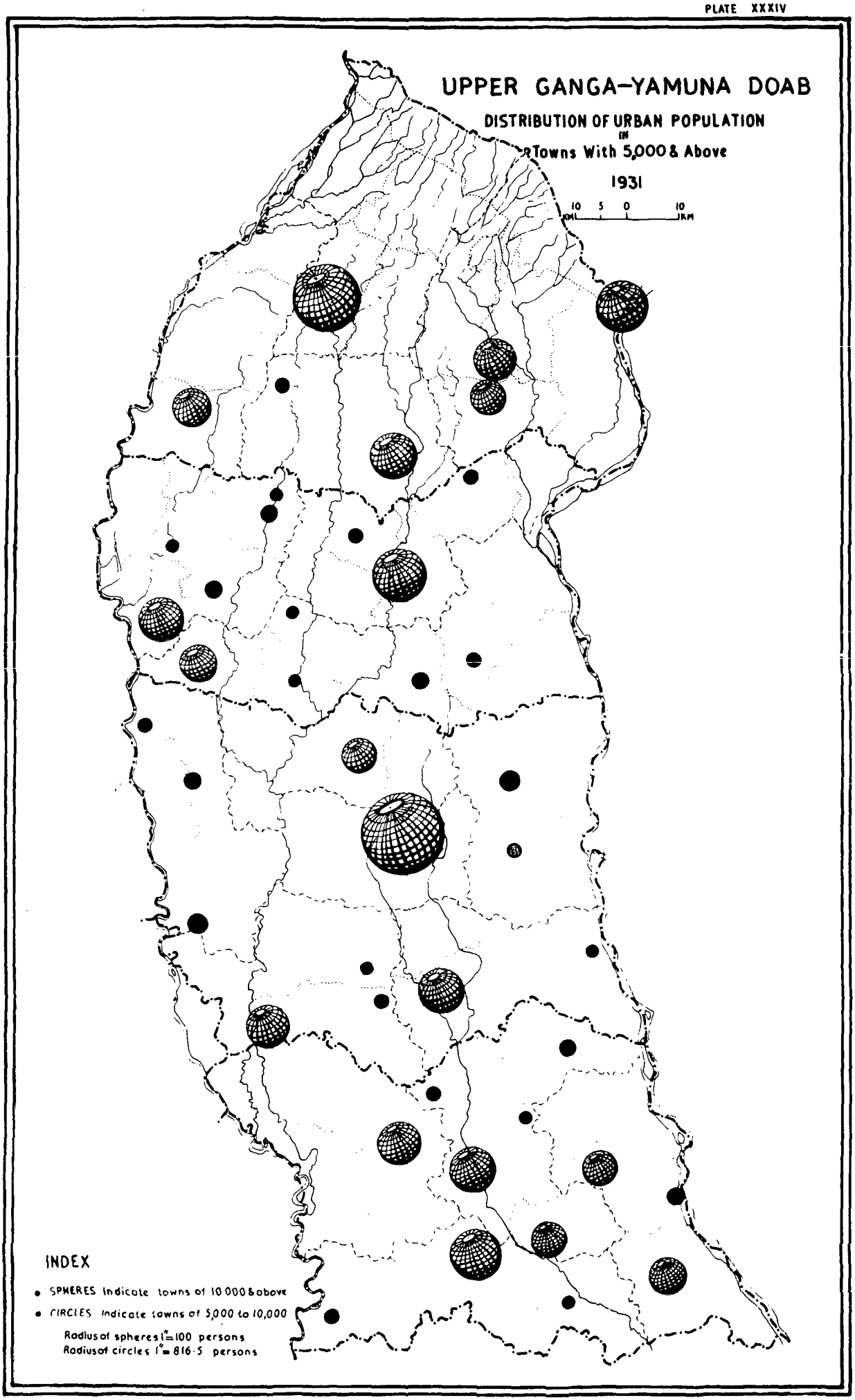
Source of Data : Census of India 1921, vol. XX, pt. II

FIG. 45



Source of Data : Census of India, 1921, vol. XVI, pt. II

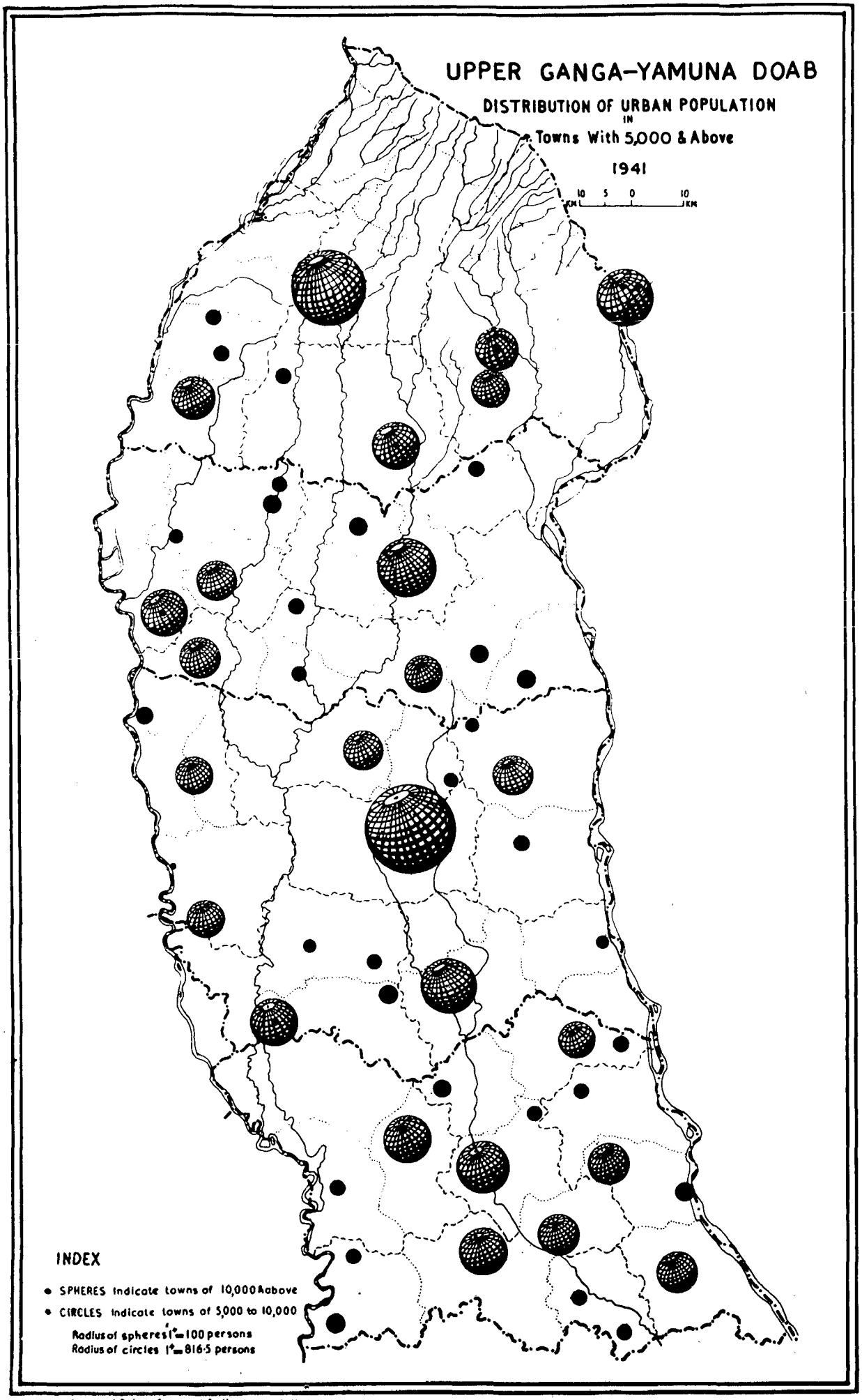
FIG. 46



Source of Data : Census of India 1931, vol. XVIII, pt. II

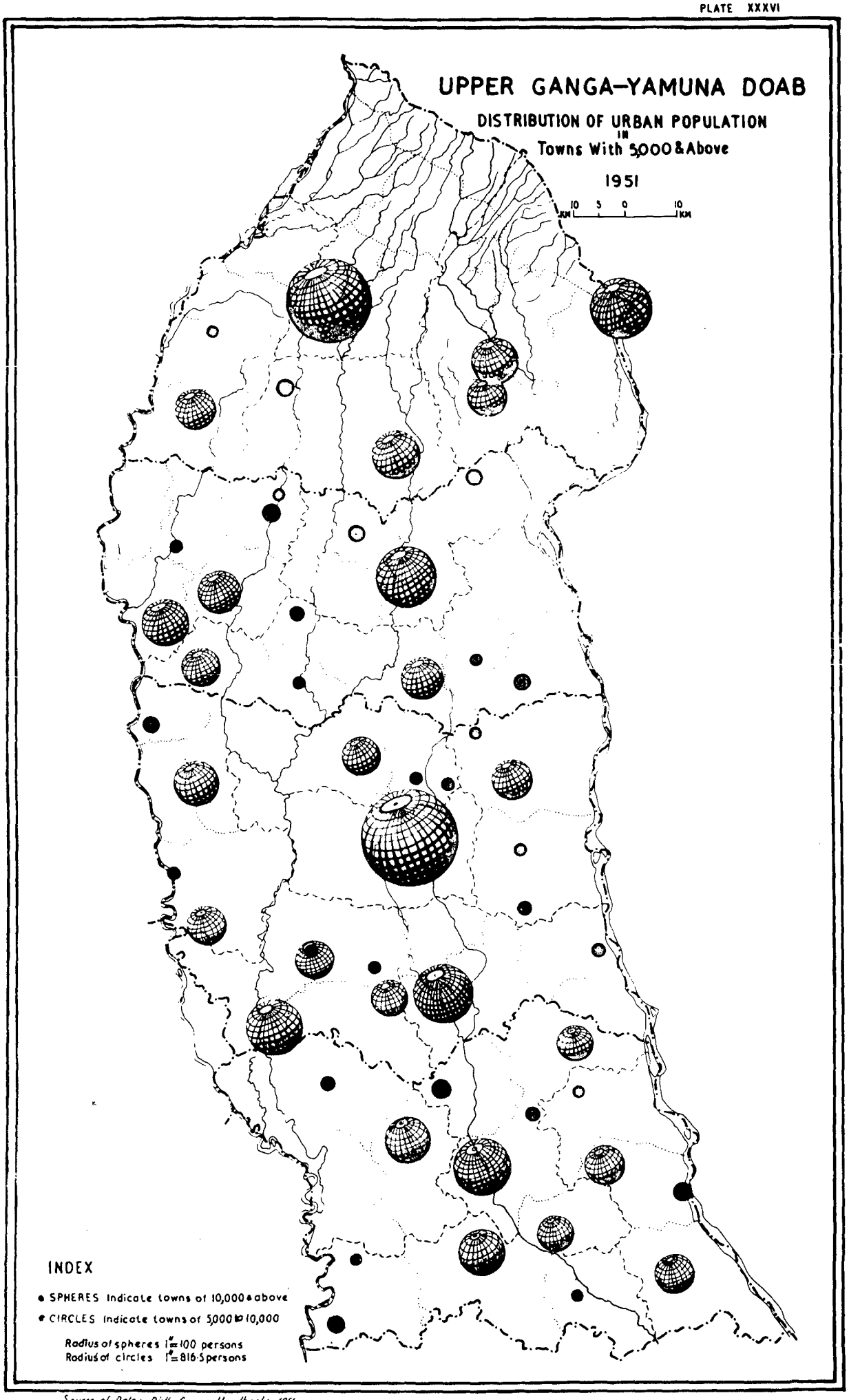
FIG. 47

PLATE XXXV



Source of Data : Census of India 1941, Vol. V

FIG. 48



Source of Data : Distt Census Handbooks 1951

FIG. 49

of the upper classes especially those of the I and III class registered considerable increase in their size. Table LIX gives an idea of the percental variation of population in towns of various classes as well as of the number of towns in each class during fifty years. It will be noted from the table that the towns of the first three classes accounted for almost 77 per cent of the total increase in Doab's urban population. Increase in class I towns' population alone was 47 per cent of the total.

TABLE LIX
VARIATION OF POPULATION AND NUMBER OF TOWNS OF DIFFERENT CLASSES IN UPPER DOAB, 1901-1951

Class of towns	Population		Variation		Number	
	1901	1951	Absolute	Percental	1901	1951
1	2	3	4	5	6	7
I (100,000 & over)	118,539	381,618	263,079	221.9	1	2
II (50,000 to 100,000)	66,254	121,551	55,297	83.4	1	2
III (20,000 to 50,000)	153,728	265,351	111,623	72.6	7	8
IV (10,000 to 20,000)	118,328	210,051	91,723	77.5	9	15
V (5,000 to 10,000)	210,423	212,272	1,849	0.8	32	31
VI (Under 5000)	48,714	85,036	36,322	74.5	14	22
TOTAL*	715,986	1275,879	559,893	78.0	64	80

S O U R C E : Calculations based on data from District Census Handbooks - 1951

* In District Census Handbooks the variation of population of only those towns are given which were recognized as towns in 1951 and hence the difference in total for 1901

It has already been pointed out in the previous chapter that the mean decennial growth-rate of the urban population has been more than one and-a-half times faster than that of the rural population during the last thirty years. The contrast in the growth-rates becomes more striking when the percental variations of the rural and urban population for the accumulated period of

fifty years from 1901-1951 are compared. Table LX shows that the percental increase in Upper Doab's urban population was nearly two times of that of the rural population. The table also indicates that there was considerable variation in the rates of increase amongst the districts. Though the highest increase of 81.7 was recorded in Meerut, the highest percental increase vis-a-vis the rural increase was, however, recorded in Saharanpur where the urban increase was 67.4 per cent against the corresponding rural increase of only 20.4 per cent. In contra-distinction to this the position in the southern most district of Bulandshahr was rather the reverse. There the urban increase was short of the rural increase by as much as 7.0 per cent.

TABLE LX
ABSOLUTE AND PERCENTAL VARIATION IN URBAN AND RURAL POPULATION BY DISTRICTS FOR FIFTY YEARS 1901-1951

District	Urban		Rural	
	Absolute var.	Percent var.	Absolute var.	Percent var.
1	2	3	4	5
Saharanpur	135,917	67.4	172,489	20.4
Muzaffarnagar	70,538	52.4	274,042	36.9
Meerut	224,701	81.7	516,341	40.8
Bulandshahr	48,753	25.8	313,030	32.8
Upper Doab	479,909	60.3	1,275,702	33.5

S O U R C E : Calculations based on data from Census of India, U.P. 1901 and 1951, Imperial and General Tables.

The relatively high increase of urban population as has already been pointed out, was due more to migrations than to higher natural growth in urban

centres. It may, however, be recalled here that the majority of Upper Doab' urban centres were merely tiny or molecular centres of indiginous and local trade and have almost invariably developed from an earlier rural character and origin. This is true of almost all the towns with the exception of a few ones such as Meerut, Saharanpur and Daurala. As such these centres did not possess that attraction for the rural population which is noticeable among the towns of certain European and American countries. However, a comparable attraction or urban pull has, of late, developed in certain high class towns of the region. This is one of the main reasons why there was a striking contrast in the rate of growth of the towns of different classes. (table LIX). As noted earlier the migration became an effective force of propelling the rate of urban growth from the beginning of the second quarter of this century. The increased magnitude of rural emigration was,however, not a result of urban pull alone. There was also a measure of push from the rural areas due to general deterioration in agricultural conditions and decrease in cultivated land per capita. The details of agricultural situation will be discussed in a later chapter it may, however, be noted here that Mr. Rajeshwar Parshad's observation that "it was due to the deterioration in the agricultural conditions during the last three years of the decade 1921-30 that there was a large volume of immigration of rural people to the large cities of the State in order to earn their livelihood, the slump in prices of agricultural produce was largely responsible for this deterioration"[13] represents the general situation of agriculture and population which prevailed in almost every district of the State.

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13. Parsad, R. Census of India 1951, Vol.II, U.P. Part I-A Report,p.163.

The agricultural conditions did not improve in the fourth decade. The earlier years of the decade were badly affected by international slump in agricultural prices and abnormally high and damaging rainfall in the Upper Doab region. The rural emigration, therefore continued to operate steadily till the close of the thirties when it received a new impetus by the breaking out of the second world war. Industries and commerce developed at a frantic pace in the cities of Upper Doab to meet the ever increasing needs of the escalating war. These industrial and commercial enterprises provided good opportunities of profitable employment and, despite the relatively improved agricultural conditions of the fifth decade, the rural emigration continued to be an important factor in the rapid growth of population in urban centres especially of the upper classes.

In the mid of the decade 1941-51 a new dimension was added to the force of migration as a cause of increase of urban population. As a result of the partition of the subcontinent a two-way migration of Hindus and Muslims started accross the borders of the newly born independent states of India and Pakistan.[14] Besides this legally international migration, the partition also resulted in displacement of thousands of persons who, when once displaced, preferred to live in cities and pursue non-agrarian professions. The settlement of the displaced persons took place chiefly in the districts of Meerut, Saharanpur and Muzaffarnagar. This incidentally also explains why the Bulandshahr district lagged so much behind the other districts of the region in the growth and increase of urban population.

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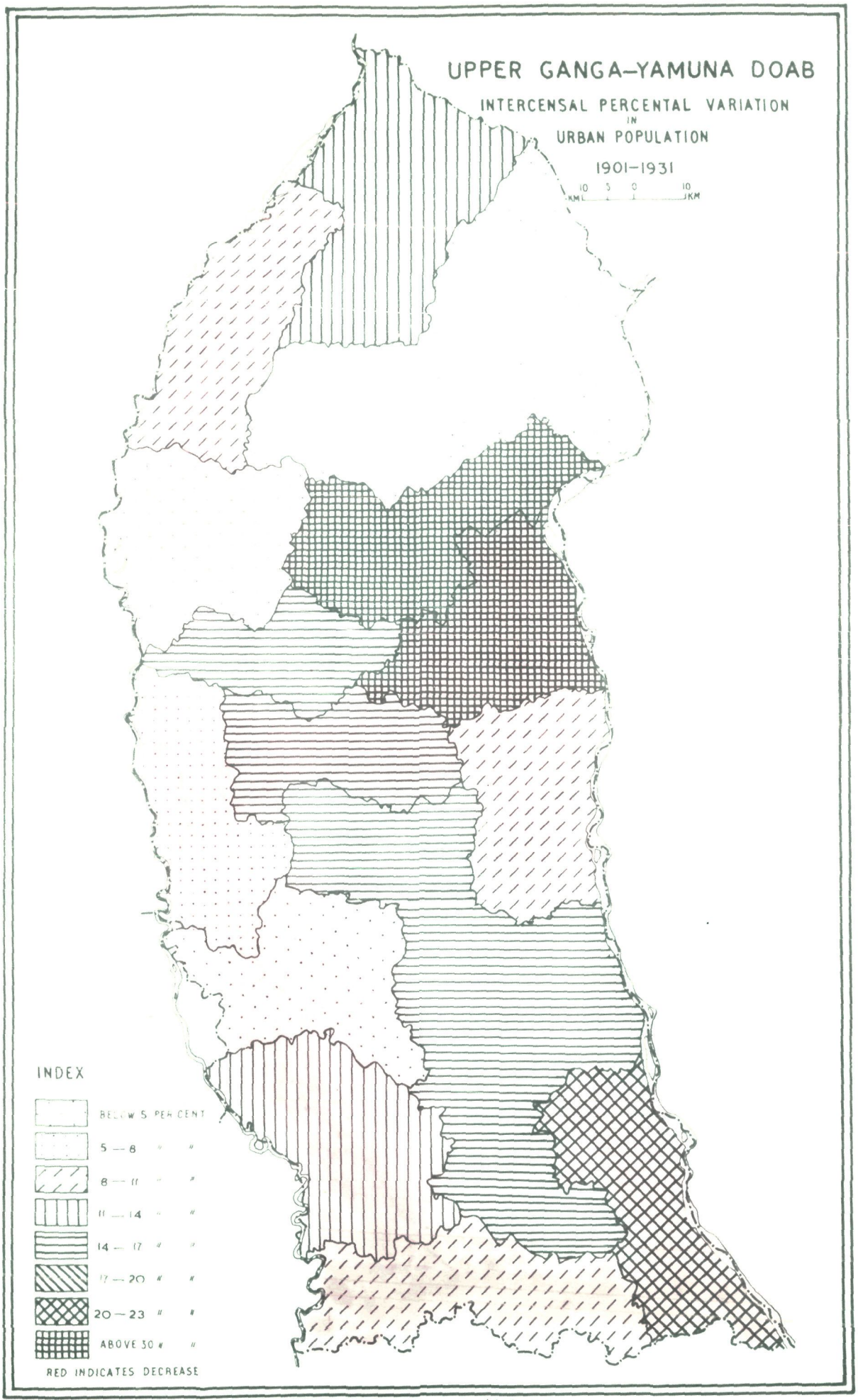
14. The international migration alone was not an important factor causing appreciable increase in the population of urban centres because it was a two-way affair.

2. GROWTH AND DISTRIBUTION BY TAHSILS

Like the growth of rural population the growth of urban population did also vary considerably from tahsil to tahsil. Tahsil-wise percentages of the mean decennial growth-rates of urban population are set out in table LXI. The table shows that the decline in urban population was almost universal during the first decade. The highest decline was in Mawana tahsil where the urban population decreased by 34.59 per cent on the total of 1901. The other chief losers were the tahsils Budhana (-27.68), Anupshahr (-25.71), Sardhana (-24.11 per cent), Nakur (-23.76), Jansath (-23.52 per cent), Kairana (-17.10 per cent), and Baghpat (-16.44). On the other extreme were the tahsils Hapur and Meerut which recorded the lowest decline, the mean decennial rates being -0.58 and -1.44 per cent respectively. In the rest of the tahsils the loss ranged between 4.39 and 10.37 per cent. The tahsils of Muzaffarnagar district were worst affected from the decline. The relative magnitude of losses suffered by various tahsils are depicted in Figs.43 and 5

The decline was, however, short lived. In the second decade the majority of the tahsils recorded a positive rate of growth. There were only eight tahsils which were still on the losing side. The decline was universal in Bulandshahr: All of its four tahsils sustained losses of considerable magnitude. The highest loss of 12.92 per cent was in Khurja tahsil whereas even the minimum loss of 4.73 per cent in Bulandshahr tahsil was substantially higher than the average for the whole of Upper Doab. The other four deficit



Source of Data : Census of India 1901, Vol XVI-A, pt. II, 1931, Vol. XVIII, pt. II and Distt Gaz 1903

FIG. 50

TABLE LXI

MEAN DECENNIAL GROWTH-RATE OF URBAN POPULATION BY TAHSILS, 1901-1950

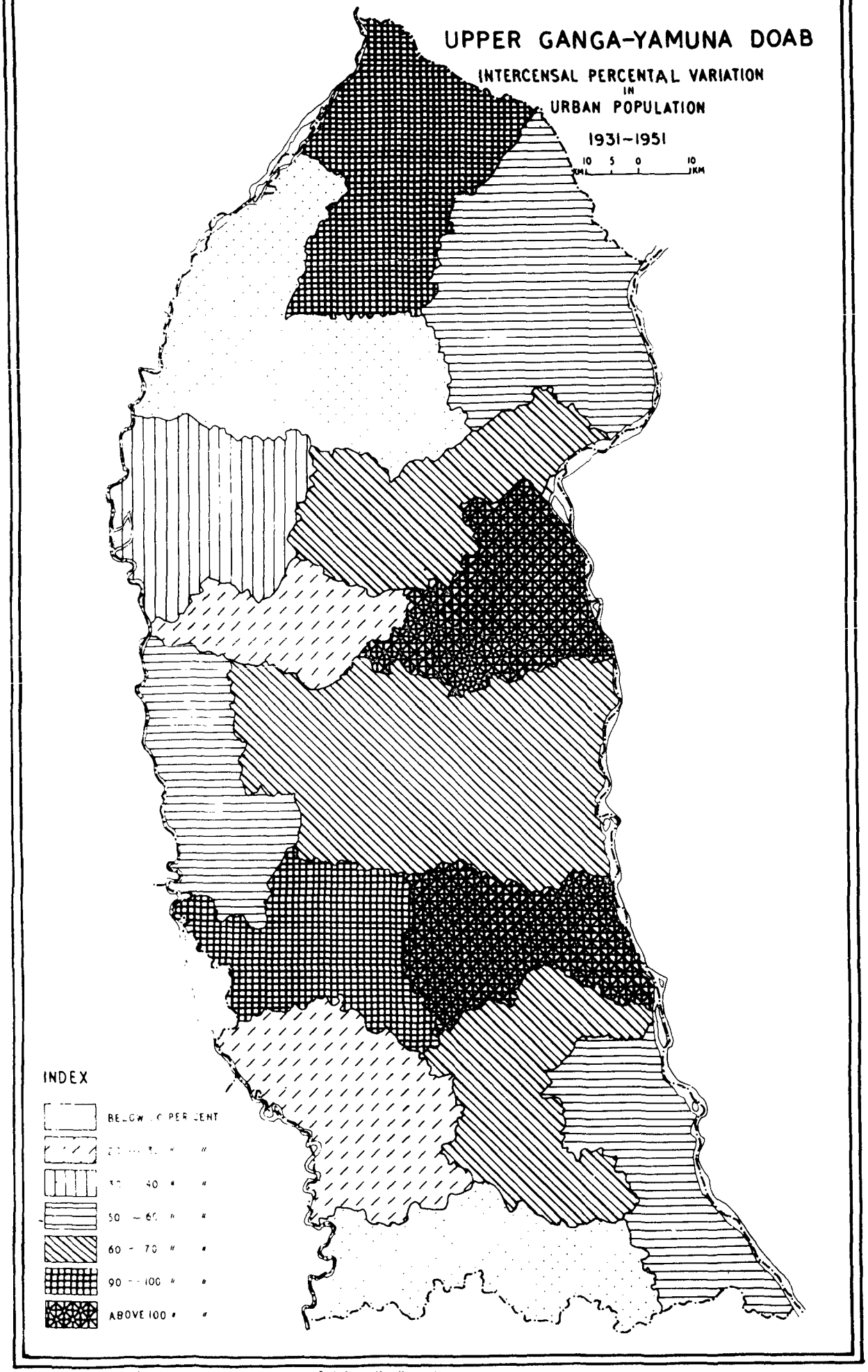
Tahsil	Mean decennial growth rate during the decade 1901-10	1911-20	1921-30	1931-40	1941-50
1	2	3	4	5	6
Deoband	-10.37	- 6.33	+ 17.95	+ 8.76	+ 7.58
Roorkee	- 6.79	+ 0.67	+ 7.48	+ 24.62	+ 26.35
Nakur	-23.76	+ 5.98	+ 7.32	+ 17.59	- 1.60
Saharanpur	- 6.49	- 4.27	+ 23.26	+ 33.71	+ 32.76
DISTRICT	-10.23	- 1.29	+ 14.80	+ 24.71	+ 23.23
Budhana	-27.68	+10.68	+ 30.94	+ 16.70	+ 7.76
Jansath	-23.52	-18.06	-23.39	+ 56.44	+ 13.00
Kairana	-17.10	+ 3.71	+ 10.42	+ 19.23	+ 10.30
Muzaffarnagar	- 6.75	+ 1.69	+ 33.14	+ 25.15	+ 25.73
DISTRICT	-17.19	+ 0.21	+ 17.00	+ 25.88	+ 16.03
Baghpat	-16.44	+ 5.95	+ 4.20	+ 14.32	+ 30.80
Ghaziabad	- 6.20	-13.08	+ 14.35	+ 22.03	+ 41.52
Hapur	- 0.58	+ 4.41	+ 14.33	+ 25.19	+ 40.40
Meerut	- 1.44	+ 4.27	+ 12.53	+ 23.38	+ 27.84
Mawana	-34.59	+ 0.48	+ 11.31	+ 19.60	+ 32.41
Sardhana	-24.11	+ 1.07	+ 3.93	+ 20.75	+ 27.64
DISTRICT	- 8.05	+ 1.35	+ 11.53	+ 22.39	+ 32.12
Bulandshahr	- 4.39	- 4.73	+ 22.50	+ 18.47	+ 16.49
Anupshahr	-25.71	- 8.74	+ 9.45	+ 29.60	+ 17.07
Khurja	- 8.92	-12.92	+ 13.33	+ 13.23	+ 2.84
Sikandarabad	- 5.91	- 7.20	+ 0.92	+ 15.67	+ 2.71
DISTRICT	-10.25	- 8.47	+ 13.26	+ 18.42	+ 10.40
Upper Doab	-10.60	- 1.70	+ 14.60	+ 22.75	+ 22.89
U.P.	- 9.27	+ 0.38	+ 12.03	+ 23.05	+ 20.52

SOURCE: Calculated from tahsil figures derived from the data given in the Imperia and Provincial Tables, Census of India 1901,1911,1921,1931.1941.and 1951.

tahsils were Jansath (-18.06 per cent), Ghaziabad (-13.08), Roorkee (-6.33) and Saharanpur (-4.27) per cent. The gain in the growth-rate in the remaining ten tahsils was not sufficiently high to make up for the loss in the eight tahsils with the result that Upper Doab, on the whole, was still running with a deficit of 1.70 per dent. The highest gain which any tahsil recorded was 10.60 per cent and it is rather surprising that it was in the tahsil of Budhana which had the second highest rate of decline in the previous decade. The pattern of intercensal variation of urban population by tahsils is shown in Figs.50,51 and 52 for the three selected periods namely 1901-31, 1931-51 and 1901-51.

* * *

It has already been noted earlier in connection with the rural growth-rates that such indices of variation should always be taken with certain reservations as some element of fallacy is almost always latent in such calculations. Budhana was decidedly not a tahsil of high urbanity nor even its urban population had very high increase in absolute numbers. The urban population of Budhana at the three census years 1901,1911 and 1921 was 22,331, 16,899 and 18,807 respectively. This means that during the second decade the tahsil had only an absolute gain of 1,908 persons on the total of the previous census i.e. 1911. On the contrary, Meerut tahsil after a loss of 1.44 per cent during the first decade had a gain of only 4.27 per cent - less than half of Budhana's gain. But when actual numbers are considered it is found that Meerut's urban population increased by



Source of Data: Census of India 1931, pt. II and Distt. Census Handbooks 1951

FIG. 51

5,400 persons in 1921 on the 1911 population. It therefore seems very desirable to have the absolute figures of growth also. For this reason the absolute intercensal variations of urban population are set out by tahsils in table LXII.

* * *

From the comparison of tables LXI,LII and LXII it is evident that the urban population, on the whole, failed to keep pace with the growth-rates and percental variations of the rural and general population during the first two decades. As noted earlier the decrease in rural population was mainly due to the break out of epidemics in the later years of the second decade. That, despite of the influx of rural population into towns due to influenza, the urban population could not keep pace with the general population simply indicates that the majority of the towns at that time were towns merely by virtue of administrative definition otherwise they lacked both in the development of industry and in public health conditions.[15]

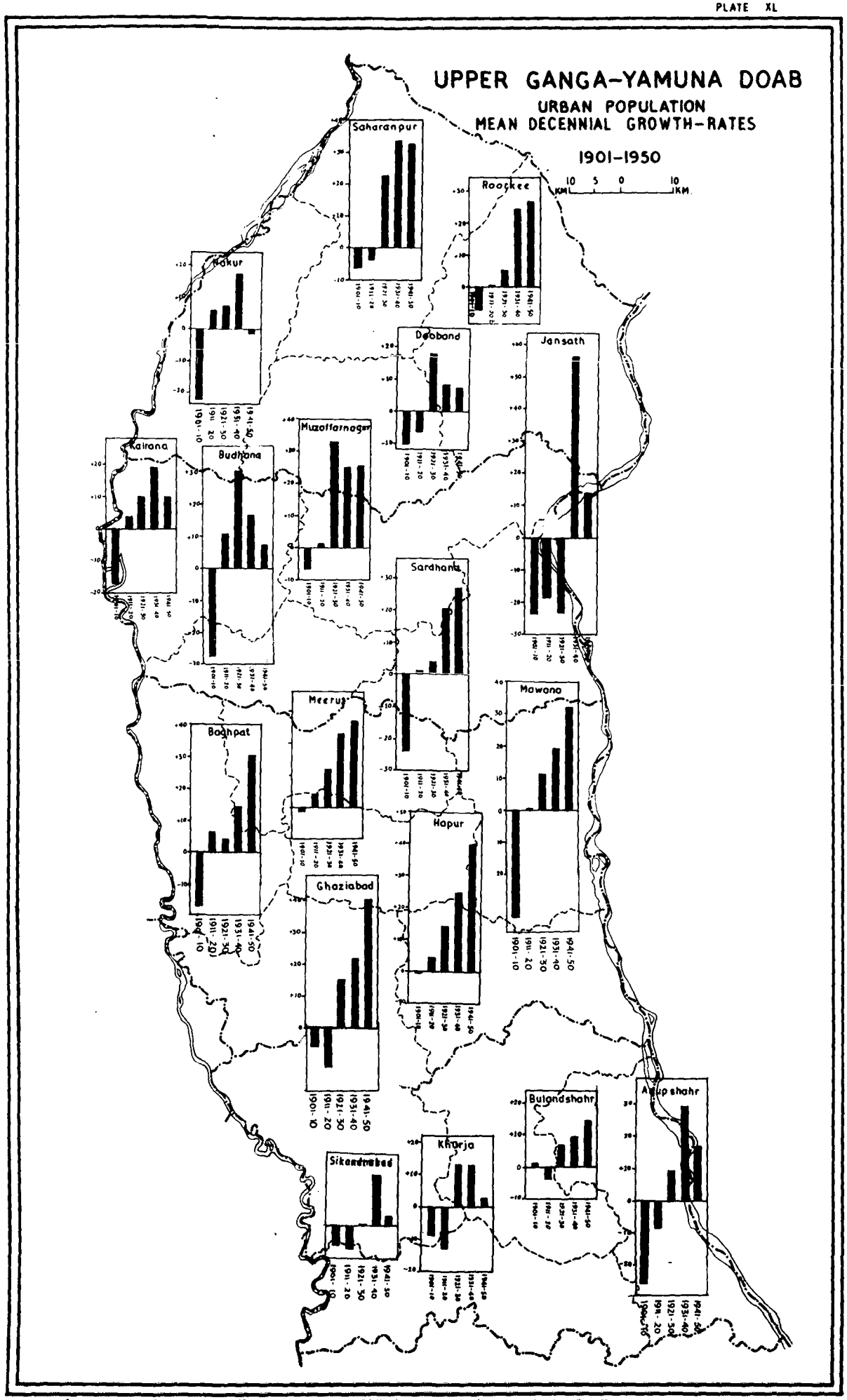
It will be seen from Fig.53 that from the commencement of the third decade the urban growth-rates began to increase on an unprecendented scale. Jansath was the lonely tahsil to have suffered a loss during this decade. The main cause of this was that the town of Miranpur (Jansath tahsil) was, for administrative reasons, demoted from its earlier urban status to the rural class. This meant a loss of nearly 6,000 persons as according to 1921 census the population of Miranpur was 5,938 persons. In five of the eighteen tahsils the growth-rate was higher than the Upper Doab average. Muzaffarnagar tahsil was the top gainer with the maximum growth-rate of 33.14 per cent. Budhana was a close second with a rate of 30.94

15. Census of India, 1921, U.P. of Agra and Oudh, Vol.XVI. Part I-Report, pp.34-35.

TABLE LXII
ABSOLUTE DECENNIAL VARIATION OF URBAN POPULATION
BY TAHSILS, 1901-1951

Tahsil	Absolute variation in the decade 1901-11	1911-21	1921-31	1931-41	1941-51
1	2	3	4	5	6
Deoband	- 3,224	- 1,809	+ 5,452	+ 3,032	+ 2,847
Roorkee	- 4,124	+ 395	+ 4,590	+ 17,879	+ 24,861
Nakur	- 7,817	+ 1,789	+ 2,301	+ 6,386	- 629
Saharanpur	- 4,360	- 2,717	+ 16,394	+ 31,505	+ 43,166
DISTRICT	- 19,525	- 2,342	+ 28,737	+ 58,802	+ 70,245
Budhana	- 5,432	+ 1,908	+ 6,883	+ 4,687	+ 2,453
Jansath	- 6,045	- 3,757	- 3,963	+ 11,765	+ 3,709
Kairana	- 7,493	+ 1,516	+ 5,474	+ 9,820	+ 6,081
Muzaffarnagar	- 2,353	+ 577	+ 13,617	+ 13,777	+ 18,214
DISTRICT	- 21,323	+ 244	+ 21,111	+ 40,049	+ 30,457
Baghpat	- 5,404	+ 1,852	+ 1,374	+ 5,152	+ 14,030
Ghaziabad	- 2,748	- 5,279	+ 5,840	+ 10,783	+ 28,451
Hapur	- 147	+ 1,141	+ 4,076	+ 10,519	+ 20,707
Meerut	- 1,796	+ 5,400	+ 17,279	+ 38,787	+ 59,920
Mawana	- 7,437	+ 86	+ 2,141	+ 4,339	+ 9,415
Sardhana	- 3,768	+ 148	+ 757	+ 3,392	+ 5,788
DISTRICT	- 21,297	+ 3,448	+ 31,467	+ 72,772	+ 138,311
Bulandshahr	- 2,223	- 2,297	+ 12,022	+ 12,100	+ 12,863
Anupshahr	- ~~2,456~~ -8,648	- 2,456	+ 2,665	+ 10,254	+ 7,411
Khurja	- 4,880	- 6,329	+ 6,759	+ 7,447	+ 1,731
Sikandarabad	- 2,265	- 2,369	+ 206	+ 5,687	+ 1,075
DISTRICT	- 18,016	- 13,451	+ 21,652	+ 35,488	+ 23,080
Upper Doab	- 80,161	- 12,101	+ 102,967	+ 207,111	+ 262,093
U.P.	-478,278	+ 18,959	+ 631,875	+1451,397	+1605,429

S O U R C E : Calculations based on data from Census of India, U.P., Imperial and Provincial Tables for various years, Table 1.



Source of Data : Census of India 1901 vol. XXI-A, pt. II ; Distt. Census Handbooks 1951 and Distt. Gaz. 1903

FIG. 53

per cent. Saharanpur (23.26 per cent) followed in the third place with Bulandshahr and Deoband occupying fourth and fifth place. Among the remaining tahsils Sikandarabad had the ~~lest~~ lowest growth-rate of 0.92 per cent with Sardhana recording the second lowest rate of 3.93 per cent. In the remaining tahsils the rates varied from 4.20 per cent in Baghpat to 14.35 per cent in Ghaziabad.

In the next decade i.e. 1931-40 the whole regional pattern of growth became considerably changed. Many tahsils reached their peaks of growth during this decade. The high growth-rate tahsils of the previous decade were surpassed by many tahsils which were at the lower rung of the growth level during that decade. As a matter of statistical fact Jansath had the highest growth-rate of 56.44 per cent (the ever highest in Upper Doab However this high percentage was not the true index of relative urbanity of the tahsil. The main cause of this extraordinary rate was the reinstatement of Miranpur to the urban category from which it was demoted in the third decennium. After Jansath the tahsils which had high growth-rates were Saharanpur (33.71 per cent), Anupshahr (29.60 per cent), Hapur (25.19 per cent), Muzaffarnagar (25.15 per cent), Roorkee (24.62) and Meerut (23.38 per cent). In all these tahsils the growth-rat was above the State and Upper Doab averages of 23.05 and 22.75 per cent respectively. In the remaining tahsils except Deoband the growth-rate was rather evenly graded and fairly high ranging between 13.23 and 20.75 per cent. The lowest rate was in Deoband tahsil being only 8.76 per cent. Five tahsils reached their peaks of growth-rate during this decade. These were the tahsils Nakur, Saharanpur, Jansath, Kairana, Anupshahr, and

Sikandarabad. In the fifth decade those tahsils which touched peak of growth-rate in the previous decade naturally suffered from a reduction in their mean rates of growth. With the exception of Saharanpur tahsil, where the reduction was very nominal being only 0.95 per cent, the reduction in others was considerable. In Nakur the growth-rate reduced to a negative 1.6 per cent from a positive 17.59 per cent during 1931-40. Similarly the reduction in Jansath was tremendous: the growth rate dropping from + 56.44 per cent to + 13.00 per cent in the fifth decennium. Kairana sustained a reduction by about 47 per cent of the previous growth-rate. Sikandarabad and Anupshahr were the main losers in Bulandshahr district. Sikandarabad lost by about 83 per cent and Anupshahr by about 43 per cent of their respective peak rates of the previous decade.

The five tahsils which attained peak of their growth-rates in the third decennium continued to decline during the fifth decade also. Muzaffarnagar, however, may be considered an exception but only of an academic significance because the tahsils's rate after dropping to 25.15 per cent in 1931-40 from the peak of 33.14 per cent made a slight improvement in the fifth decade to register a growth-rate of 25.73 per cent - an improve-ment of 0.58 per cent over the previous rate. The remaining four tahsils of Deoband, Budhana, Bulandshahr and Khurja suffered from a continual decline of appreciable magnitude.

A third category of continued increase of growth-rate may also be recognized. To this category belonged four tahsils of Meerut district and, one tahsil of Saharanpur district. In the tahsils Hapur, Meerut, Mawana and Sardhana the increase was not only uninterrupted but also quite

appreciable in amount. Roorkee tahsil of Saharanpur also had a comparable record of continued increase of growth-rate from the beginning of the second decade. These trends of growth-rates of urban population are graphically shown in Figs.31 and 43.

The distribution of the dates of peak of urban population and the different categories of growth on the basis of mean decennial growth-rates are shown in table LXIII. It is evident from the table that during fifty years considerable adjustments took place in the areal distribution and the growth of urban population. From a rather even diffusion the urban population tended to concentrate more and more in certain tahsils and avoid certain others. Through this process of differential growth certain tahsils emerged as significantly urban relative to others which became comparatively more rural. It will also be observed from the table that relatively high growths of urban population occurred in either Sadar tahsils or those tahsils which contained towns of some special significance such as religious centres. The most noteworthy point is that the continued growth has been the undisputed monopoly of the Meerut district. All the six tahsils of the district continued to grow their urban population and attained maximum growth-rates in 1951. The only other tahsil which belonged to the category of continued growth was that of Roorkee. Roorkee tahsil's urban population was almost entirely dependent upon the important religious centre of Hardwar which is a fast developing town. A reference to the growth of Hardwar has already been made in the earlier chapter in connection with migrations. Continued increase in urban growth-rates in the tahsils of Meerut is a furth confirmation of the previously noted fact that both the district and the cit of Meerut has throughout been the most developing area of the urban populati

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TABLE LXIII

TAHSILS ARRANGED ACCORDING TO CATEGORIES OF MEAN DECENNIAL GROWTH-RATES OF URBAN POPULATION, 1901 - 1950.

Growth Categories			Decline Categories			
A_1 Continued	A_2 Interrupted		B Below 25%	C 25-50 %	D 50-100%	E Above 100%
		Decade of interruption				
1. Roorkee	1. Baghpat	1921-30	1. Saharanpur 2.8%	1. Buland-shahr 27.0%	1. Deoband 57.7%	1. Nakur 109%
2. Ghaziabad	2. Sardhana	1921-30	2. Muzaffar-nagar 22.3%	2. Anupsha-hr. 42.3%	2. Budhana 74.9%	
3. Hapur						
4. Meerut						
5. Mawana				3. Kairana 46.4%	3. Jansath 78.6%	
					4. Khurja 78.6%	
					5. Sikandara-bad. 82.7	

S O U R C E : Calculated and adapted from table LXI.

16. The scheme of categorization used in this table is slightly different from that suggested and used by Dodge. He has made no distinction between continued growths with and without interruption. For instance, he has considered Plainfield (Connecticut) as belonging to the category 'A' of continued growth while the population of Plainfield did actually decline about 1800 A.D., and then about 1880 A.D. before attaining its peak population of 8,027 persons in 1930 A.D. (Dodge, S.D., op.cit. pp.199-200). Here, in order to distinguish the uninterrupted from the interrupted continued growth, Dodge's category 'A' has been subdivided into 'A_1' and 'A_2' and the decades of interruption are noted against the relevant tahsils. An additional category 'E' of more than 100 per cent decline has also been introduced to the categories suggested by Dodge.

of Upper Doab. Though there were a few towns in the districts which declined both in respect of absolute population and the mean growth-rate but their number and the magnitude of their decline were too small to make any noticeable mark on the general position of the growth of urban population of the tahsil they belonged to.

The pattern of regional and class-wise growth of towns shown in table LIX and discussed above indicates that in the last two decades of the half century the smaller country-towns were thrown into insignificance by the larger towns. It will,therefore, be worth its while to make a brief study of the growth of towns of Upper Doab during 1901 to 1951.

The set of six maps (Figs.44 - 49) depicts the decennial growth of the towns having a population of 5,000 or more persons from 1901 to 1951. These maps give not only the regional pattern of the hierarchy of towns but also indicate the dominance of the bigger towns and cities in respect of growth. However, a still vivid idea of the differential magnitude of growth amongst the towns of Upper Doab is had when they are grouped in categories of growth used by Dodge and Kendell.[17] Tables LXIV ,LXV ,LXVI and LXVII show that all the upper class towns and the majority of the towns of the middle class had a continued growth whereas a considerable number of low class towns declined after attaining population peaks in earlier decades of the century (Fig.54). It will be seen that the declining towns generally belonged to the peripheral tahsils and parganas where the improved systems of communication and transport were rather lacking in earlier decades. The fact that these declining towns

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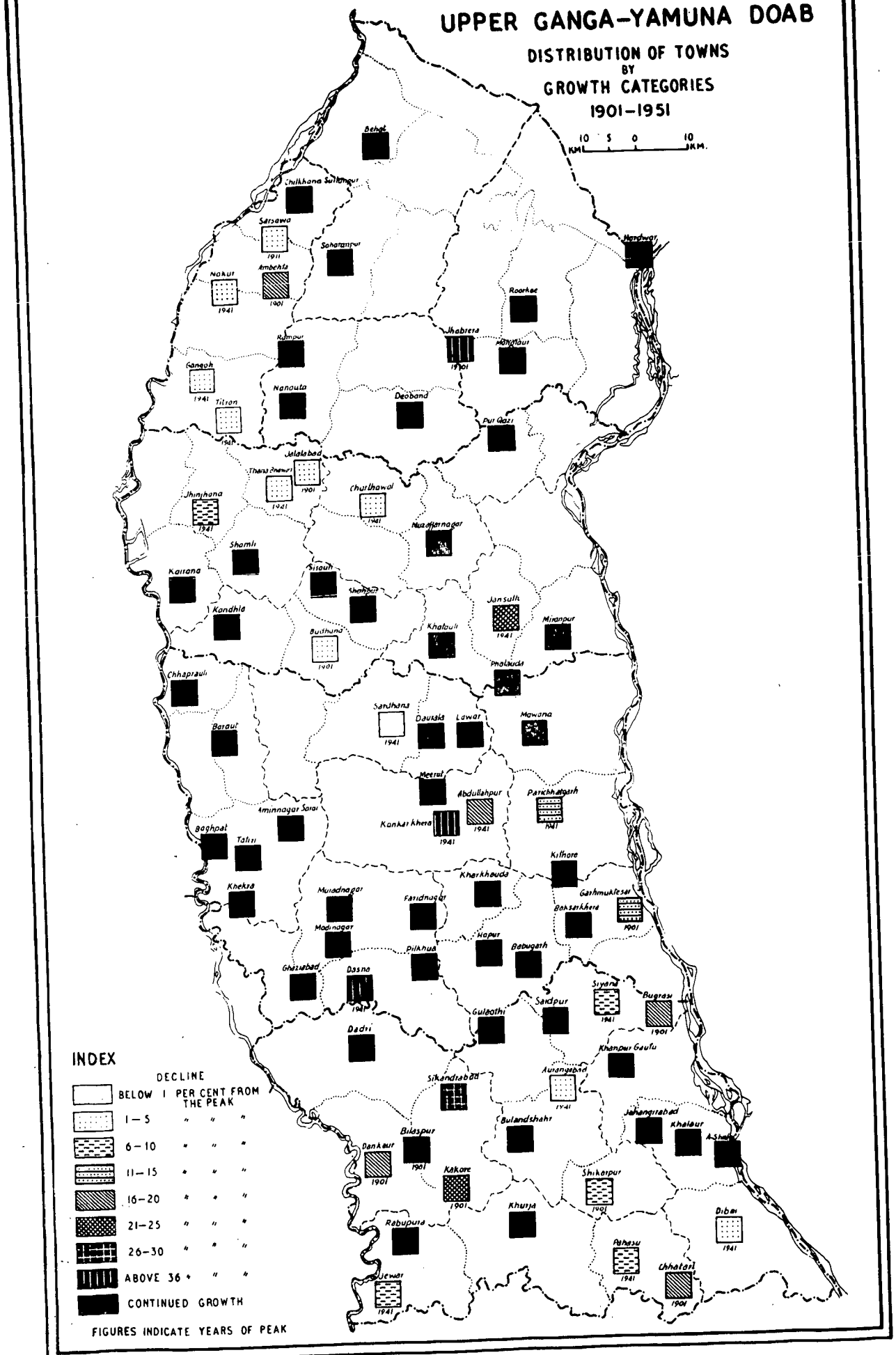
17. Dodge,S.D: " A study of Population Regions in New England on a New Basis", Annals of the Association of American Geographers,Vol.XXV,No.4 Dec.1935 pp.197-210
Kendell, H.M. " Survey of Population Changes in Belgium, " Annals of the Association of American Geographers, Vol.XXVIII, No.3 Sept.1938,pp.145-164.



Source of Data : Census of India, U.P. for the years 1901 to 1951.

FIG. 54

TABLE LXIV

POPULATION OF THE TOWNS OF SHARANPUR DISTRICT
1901-1951

S.No.	Town	1901	1911	1921	1931	1941	1951
1.	Saharanpur	66,254	62,850	62,261	78,655	108,263	148,435
2.	Hardwar	25,597	28,682	30,764	33,287	40,823	57,338
3.	Deoband	20,167	18,614	17,891	22,126	24,662	25,906
4.	Roorkee	17,148	16,584	16,716	17,476	17,334	23,239
5.	Gangoh	12,971	11,373	11,843	12,812	16,266	16,033
6.	Manglaur	10,763	9,282	8,852	10,044	11,093	13,751
7.	Roorkee Cantt.	...	2,734	4,470	3,532	10,030	9,853
8.	Rampur	7,945	6,899	6,165	6,795	6,829	8,296
9.	Nakur	5,030	4,136	4,140	4,513	6,036	5,731
10.	Chilkhana Sultanpur	3,584	2,726	4,443	4,855	4,818	4,944
11.	Behat	...	...	...	...	4,538	4,891
12.	Ambehta	5,751	4,524	4,153	4,405	5,111	4,790
13.	Nanauta	4,567	3,942	3,590	4,177	4,639	4,775
14.	Titron	3,298	2,741	3,161	3,480	4,042	3,970
15.	Sarsawa	3,439	3,499	3,048	3,024	3,202	3,378
16.	Jhabrera	3,479	2,147	2,740	2,855	2,261	2,221

Note : The underlined figures indicate population peak. The towns without any underlined figures are towns of continued growth.

SOURCE : District Census Handbook of Saharanpur 1951, and Census of India, U.P. Imperial and Provincial Tables for various years.

continued to exist as urban centres and also managed to record some increase in population during certain decades indicates that the rural economy was very much indigenous in character and was principally dependent upon such centres of pseudo-urban character for marketing and shopping services. But when transport systems improved and the services available at the bigger towns and cities came within the easy reach of practically every part of the region the smaller towns failed to compete with their stronger counterparts and consequently they either began to decline or became stagnant. A few, of course, did increase their population but the increase was slow and of a very small magnitude.

TABLE LXV

THE POPULATION OF THE TOWNS OF MUZAFFARNAGAR DISTRICT 1901-1951

S.No.	Town	1901	1911	1921	1931	1941	1951
1.	Muzaffarnagar	23,444	23,811	23,937	35,347	46,758	64,213
2.	Kairana	19,304	16,293	16,683	19,589	22,644	23,163
3.	Shamli	7,478	7,312	8,425	8,940	12,416	17,986
4.	Khatauli	8,695	4,751	4,533	8,797	11,880	16,443
5.	Kandhala	11,563	8,691	10,365	11,052	13,594	14,598
6.	Thana Bhawan	8,861	6,913	6,886	7,415	9,407	9,039
7.	Charthawal	6,236	3,868	5,922	6,470	8,257	8,085

contd.

contd.

S.No.	Town	1901	1911	1921	1931	1941	1951
8.	Miranpur	...	...	...	...	7,806	8,070
9.	Pur Qazi	6,384	6,029	5,326	6,082	6,664	7,595
10.	Sisauli	...	...	...	5,707	6,641	7,120
11.	Jalalabad	6,822	5,166	4,578	5,081	5,947	6,621
12.	Budhana	6,664	4,708	4,917	5,116	6,030	6,580
13.	Jansath	6,507	5,932	5,454	6,165	7,541	5,923
14.	Jhinjhana	5,094	4,382	4,110	5,131	5,562	5,248
15.	Shahpur	4,101	3,500	3,525	3,818	4,112	4,532

Note: The underlined figures indicate the population peak; the towns without any underlined figures are towns of continued growth.

S O U R C E : District Census Handbook of Muzaffarnagar 1951 and Census of India, U.P. Imperial and Provincial Tables for various years.

TABLE LXVI

THE POPULATION OF THE TOWNS OF MEERUT DISTRICT, 1901-1951

TOWN	1901	1911	1921	1931	1941	1951
Meerut	118539	116631	122609	136709	169290	233183
Hapur	17796	19142	20388	25116	33756	49260
Ghaziabad	11275	11304	12343	18831	23834	43217
Baraut	7703	7776	9304	9390	11464	16928
Mawana	9207	7196	8197	9585	12194	15663
Khekra	8918	9402	9091	9964	11129	13429
Sardhana	12467	9242	9524	10265	12607	12556
Modinagar	...	...	...	...	...	12304
Pilkhuwa	5859	6385	6606	6766	8520	11491
Chaprauli	7058	5731	6374	6547	7484	7832
Kithore	...	...	...	...	...	6611
Garhmuktesar	7616	6123	6018	5366	5950	6555
Kankar Khera	2641	2804	2897	4316	9905	6257
Muradnagar	4659	5298	4955	4904	5529	6194
Lawar	5046	4503	4369	4385	5435	6095
Faridnagar	5620	5554	5522	6238	5383	6000
Baghpat	5972	5346	4612	4920	5519	5998
Phalauda	5214	4847	4384	4572	5558	5805
Parichhatgarh	6278	5729	5277	5842	6586	5674
Daurala	...	...	...	...	...	5179
Tatiri	...	...	...	...	...	4794
Kharkhauda	...	...	...	...	...	4672
Aminnagar Sarai	2880	1907	2633	5660	2944	3589

contd.

contd.

TOWN	1901	1911	1921	1931	1941	1951
Abdullahpur	3018	2720	2197	3364	3842	3088
Dasna	4750	4725	3922	2446	4990	3002
Loni	3325	2761	2974	2920	3275	...
Baksar Khera	1801	2042	1490	2083	2222	2651
Babugarh	...	...	...	...	1121	1195

Note : The underlined figures indicate the population peak, the towns without any underlined figure are towns of continuous growth.

S O U R C E: District Census Handbook of Meerut 1951 and Census of India, U.P., Imperial and Provincial Tables for various years.

TABLE LXVII

THE POPULATION OF THE TOWNS OF BULANDSHAHR DISTRICT, 1901 - 1951

Town	1901	1911	1921	1931	1941	1951
1	2	3	4	5	6	7
Khurja	29277	27387	25719	31279	35376	38462
Bulandshahr	18459	19383	19509	24898	29701	37496
Sikandarabad	18290	18946	16857	18974	23307	24080
Jahangirabad	11572	11218	10279	10745	12922	14679
Dibai	10579	9573	9697	11269	13218	12610
Shikarpur	12249	10278	9795	10655	11783	11475
Saina	7615	8274	7485	7647	10882	10105
Gulaothi	7208	6027	5692	6527	7901	9862
Anupshaher	8601	6419	6872	7499	8315	9358
Jenar	7718	6884	6564	6693	8592	7917
Dadri	....	....	3092	4036	4419	6668
Aurangabad	5916	5752	4936	5052	5354	5824
Khanpurgautu	....	....	....	....	5312	5617
Rabupura	5048	3602	4108	4398	5382	5530
Pahasu	5603	5555	4876	5418	5609	5135
Bugrasi	....	....	....	4660	5918	4934
Khalaur	....	....	....	....	....	4914
Said pur	....	....	....	....	....	4706
Chhatari	5574	5394	4531	4769	5045	4691
Dankaur	5444	5340	5177	4839	5289	4500

Bilaspur	3345	3101	2679	3034	2990	2471
Kakare	3152	1245	2761	2476	3041	2402
Jarcha	3873	3702	....	....	....	....
Pandrawal	3777	2305	....	....	....	....
Jhajar	3683	....	....	....	....	....
Munda Khera	2946	....	....	....	....	....
Ramghat	2603	2094	....	....	....	....

Note: The underlined figures indicate population peaks, the towns without any underlined figure are towns of continuous growth.

S O U R C E : District Census Handbook of Bulandshahr 1951, and Census of India, U.P., Imperial and Provincial Tables for various years.

The examination of the tables LXIV - LXVII shows that with only a few exceptions all the towns belonged either to the category A of continuous growth or the category B of decrease of 1-25 per cent from the peak. There were only four towns which suffered a decline of more than 25 per cent from the peak. The percentages of decline from the peak are plotted on the map to show the regional pattern of the growth of various towns of the region. In order to show the length of the period of decline the dates of population peak are also inserted.[18] It will be seen from the map that majority of the declining towns belonged to the Yamuna khadir of Saharanpur and Bulandshahr districts. A second notable belt of declining towns comprised mainly the eastern parganas of Meerut and Bulandshahr districts. It may also be noted that 16 of the 29 declining towns attained their peaks as late as 1941 while 12 towns recorded the peak population as early as 1901 and there was only one town which attained the peak in 1911. It is also noteworthy that Bulandshahr had as many as 5 of the 12 towns which have continuously declined from the first decade. Meerut district was very conspicuous for the largest number of the towns of continued growth and the smallest number of the declining towns.

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18. See appendix II.

3. GROWTH OF TOWNS BY SIZE CATEGORIES

The average size of a town in Upper Doab has throughout been smaller than average size of a town in the State. In 1901 the average size of an Upper Doab town was 10,500 persons against the State average of 11,756 persons. The average populations of a town in Upper Doab and Uttar Pradesh are set out in tableLXVIII. It will be noted that after a small decline in 1911 the population per town continued to grow steadily and at a considerably rapid rate after 1931.

In 1951 the average population increased by almost 54 per cent of the 1901 size and ~~increased~~ amounted to 15,948 persons. In the State, on the other hand, the decline continued for two decades but the growth became appreciably rapid after 1921 when the decline touched its trough.

TABLE LXVIII

THE AVERAGE POPULATION OF A TOWN IN UPPER DOAB AND THE U.P., 1901-1951

Region	Average population per town in					
	1901	1911	1921	1931	1941	1951
1	2	3	4	5	6	7
Upper Doab	10,500	9,762	10,095	11,553	14,024	15,948
U.P.	11,756	11,464	11,027	13,011	15,395	17,748

S O U R C E : Calculations based on data from Census of India, U.P. Provincial Tables 1901,1911,1921,1931,1941 and 1951.

The relatively small size of a town in Upper Doab is indicative of the fact that the majority of the urban centres were non-city or country-town These centres though classified in the census as towns, were principally rural in character of occupation of the people. The details of the occupational structure of the urban centre are given in the next subsection.

The following six classes of towns were adopted by the census:

Class	I	100,000 and over
"	II	50,000 to 100,000
"	III	20,000 to 50,000
"	IV	10,000 to 20,000
"	V	5,000 to 10,000
"	VI	under 5,000

According to this classification there were only two class I and two Class II towns in Upper Doab in 1951. The remaining seventy-six towns belonged to lower classes. Table LXIX shows the number of towns in each class together with the total and percentage of the urban population in each of the four districts. It will be noted from the table that only two districts namely Saharanpur and Meerut had urban centres of large size whereas even the district headquarters of Muzaffarnagar and Bulandshahr were only of the II and III Class respectively. Though the smaller towns (i.e. the towns below class III) did not account for more than 40 per cent of the total urban population of Upper Doab yet by virtue of the number and widespread distribution their significance was more than academic. They not only represented the lower end of the urban continuum or the fag end of the urban heirarchy but did also provide certain special services and goods to the purely agricultural peasantry surrounding them. Being developed as small centres of service to the agriculturist such towns were

naturally more agrarian and rural than urban in respect of the occupational structure of their population.

TABLE LXIX

TOTAL AND PERCENTAGE OF URBAN POPULATION IN TOWNS OF DIFFERENT CLASSES BY DISTRICTS, 1951

District	Class of town						Total of all categories
	I	II	III	IV	V	VI	
1	2	3	4	5	6	7	8
SAHARANPUR							
No. of towns	1	1	2	2	3	7	16
Population	148,435	57,338	49,145	29,784	23,880	28,969	337,551
Percentage	44.0	17.0	14.5	8.8	7.1	8.6	100
MUZAFFARNAGAR							
No. of towns	0	1	1	3	9	1	15
Population	0	64,213	23,163	49,027	64,281	4,532	205,216
Percentage	0	31.3	11.3	23.9	31.3	2.2	100
MEERUT							
No. of towns	1	0	2	6	11	7	27
Population	233,183	0	93,005	82,371	68,200	22,917	499,676
Percentage	46.6	0	18.6	16.4	13.6	4.6	100
BULANDSHAHR							
No. of towns	0	0	3	4	8	7	22
Population	0	0	100,038	48,869	55,911	28,618	233,436
Percentage	0	0	42.8	20.9	24.0	12.3	100
UPPER DOAB							
No. of towns	2	2	8	15	31	22	80
Population	381,618	121,551	265,351	210,051	212,272	85,036	1,275,879
Percentage	29.9	9.5	20.8	16.4	16.7	6.7	100

S O U R C E : Calculations based on data from the District Census Handbooks 1951

In 1951 the Upper Doab districts occupied an area of 8021 square miles compared with the State area of 113,494 square miles (or about 7 per cent of the State total) while they contained 80 towns or 16.4 per cent of the total of 486 towns of the State. These 16.4 per cent towns contained 14.7 per cent of the total urban population of U.P. Thus though the average urban density in the region was almost double of that of the State, the avera size of a town was relatively small. It also means that the small size towns were very numerous in this region. The relative positions of the towns of various sizes in Upper Doab and its districts and the State and its principal natural divisions are set out in table LXX. The table indicates that the towns of the lower middle size with a population of 5,000 to 10,000 accounted for the highest percentage in the three districts of Bulandshahr, Meerut and Muzaffarnagar and also the whole of Upper Doab. In Saharanpur district, however, the highest percentage was accounted for by smaller towns with a population range of 2,000 to 5,000 persons. This pattern of distribut of the towns by size in Upper Doab and its districts compared fairly well with that of the State and its eastern and western plains divisions. As in t hilly and mountains divisions of the State the towns of smaller size outnumbe the towns of other size classes so did the towns of Saharanpur district in Upper Doab. This is suggestive of some intimate relation between terrain and town size. Like the villages the towns also seem to have a tendency towards greater scattering with the increase in accentuation of the relief. In the Himalayan division, for instance, the percentage of the towns of very small size (1,000 to 2000) was the highest not only in the division but also in the entire State while this division also had the State's highest percentage and number of tiny towns of less than 1,000 persons.

TABLE LXX

DISTRIBUTION OF TOWNS OF VARIOUS SIZE IN THE DISTRICT OF UPPER DOAB AND NATURAL DIVISIONS OF U.P. (ACTUAL AND PERCENT), 1951

District / Region	Number / Per cent.	NUMBER AND PERCENTAGE OF TOWNS WITH A POPULATION OF 100,000 and over	50,000 to 100,000	20,000 to 50,000	10,000 to 20,000	5,000 to 10,000	2000 to 5000	1000 to 2000	Total
1	2	3	4	5	6	7	8	9	10
Saharanpur	NO	1	1	2	2	3	7	-	16
	%	(6.2)	(6.2)	(12.5)	(12.5)	(18.8)	(43.8)		(100)
Muzaffarnagar	N	-	1	1	3	9	1	-	15
	P	-	(6.7)	(6.7)	(20.0)	(60,0)	(6.6)		(100)
Meerut	N	1	-	2	6	11	6	1	27
	P	(3.7)	-	(7.4)	(22.2)	(40.8)	(22.2)	(3.7)	(100)
Bulandshahr	N	-	-	3	4	8	7	-	22
	P	-	-	(13.6)	(18.2)	(36.3)	(31.9)	-	(100)
Upper G.Y.Doab	N	2	2	8	15	31	21	1	80
	P	(2.5)	(2.5)	(10.0)	(18.8)	(38.8)	(26.2)	(1.2)	(100)
U.P.	N	14	15	47	73	179	143	11	486*
	P	(2.9)	(3.1)	(9.7)	(15.0)	(36.8)	(29.4)	(2.3)	(100)*
East Plain	N	2	1	9	12	34	23	-	81
	P	(2.5)	(1.2)	(11.1)	(14.8)	(42.0)	(28.4)	-	(100)
Central Plain	N	3	1	11	11	23	31	-	80
	P	(3.7)	(1.3)	(13.7)	(13.7)	(28.8)	(38.8)	-	(100)
West Plain	N	7	12	21	39	103	68	2	252
	P	(2.8)	(4.7)	(8.3)	(15.5)	(40.9)	(27.0)	(0.8)	(100)
Himalayan	N	1	-	2	3	7	5	8	30*
	P	(3.3)		(6.7)	(10.0)	(23.3)	(16.7)	(26.7)	(100)*
Hills and	N	1	1	4	8	12	16	1	43
Plain	P	(2.3)	(2.3)	(9.3)	(18.6)	(27.9)	(37.2)	(2.4)	(100)

* Totals marked with an asterisk include four towns of less than 1,000 persons not specified in the table.

S O U R C E : Calculations based on data from:
a) District Census Handbooks 1951,
b) Census of India 1951,Vol.II, U.P., Part I-A- Report, p.155.

The general scattering and lack of concentration of the Upper Doab towns was mainly due to the fact (as noted earlier) that the majority of the towns have grown from a rural and agrarian origin. In a predominantly agricultural region in which rural population is as high as 80 per cent loca centres of trade and commerce dealing in agricultural products are much more important than the bigger centres of specialized urban functions. This is probably one of the main reasons why there were only two towns of more than a hundred thousand population in the region. This relationship between agriculture and the distribution and size of towns was probably the main cause of the general increase in the dispersion of towns from west to east in Uttar Pradesh.[19]

The relative importance of the towns of different sizes cannot fully be measured on the basis of numeral frequency alone. The percentage of the urban population which lived in towns of various sizes does also provide an index of the distribution of urban population and the significance of the urban centres of different size categories. Table LXXI gives the percentage of urban population living in towns of various sizes in the districts of Upper Doab and the natural divisions of the State. It will be seen from the table that about 30 percent of Upper Doab's urban population lived in towns of over 100,000. This percentage was more than 9 per cent below the State

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19. The history of the origin and growth of towns of the region is a fascinating field of study rich in scope and material. But any dilution on the subject is rather irrelevant in the context of the present work. It may, however, be noted that the towns of the region have evolved through ages and most of them still contain strate of the past cultures and it appears as though the times have conjealed in material forms. In additi to the response to the needs of agriculturists as noted above the towns owed their origin also to certain political considerations, strategic exigencies, religious enthusiasm, aesthetic humours of the aristocracy and the like. All these aspects and myriad others are materially manifest in the location, the layout, the structures, the trade and traditions, and the people and their mode of life at large of these town

average of 39.1 per cent. Similarly the percentage of the region's urban population which lived in towns of 50,000 to 100,000 was about 2.6 per cent below the State average of 12.0 per cent. In subsequent categories Upper Doab's urban percentages were substantially above the State averages. On the face of it this pattern gives a contra-indication relative to the impression given by the data contained in table LXX. The relatively small concentration in big cities in Upper Doab was infact due more to the presence of some very big cities in the State outside Upper Doab than to the relatively great dispersion of small towns in the region itself. On the other hand it shows that a smooth continuum of urban centres existed in Upper Doab whereas there were big unconformities and gaps in the hierarchy of urban centres in those parts of the State where the cities of the first category accounted for nearly 40 per cent or more and then there was a sudden and precipitous fall in the size of towns. Central plain division, for example, had almost 63 per cent of its urban population living in centres of 100,000 and over whereas only 6.8, 7.3, and 5.0 per cent were returned as living in towns of 10,000 to 20,000, 5,000 to 10,000 and under 5,000 persons respectively. This poisition when put across the percentage of the number of towns of various sizes gives a clearer picture of the nature of the continuum. The 63 per cent of the urban population were distributed in only3.7 per cent of the total number of towns, only 1.3 per cent of the second category towns (50,000 to 100,000) accounted for 3.4 per cent of the population whereas the percentages of towns in the last three categories was about 14, 29, and 39 respectively and together accounted for 19.1 percent of division's urban population. The position in Upper Doab was considerably different in this respect. The percentages of population in the six categories

ran as 29.9, 9.4, 21.0, 16.5, 16.6 and 6.6 while the corresponding percentages of the towns were 2.5, 2.5, 10.0, 18.8, 38.8, and 27.4. These relative positions of the population and towns clearly indicate a better graded continuum than that which existed in the central plains. A still better graded continuum existed in the west plain division which contains the Upper Doab region. The percentages of population for the six categories in the division were 29.9, 19.4, 15.2, 13.0, 16.6 and 5.9 while those of the number of towns ran as 2.8, 4.7, 8.3, 15.5, 40.9 and 27.8 in that order. These different patterns of continuum are not simply matters of academic and statistical interest. They have also some practical economic implications especially in the food situation because of their bearing on the nature of urban rural balance. This point will be discussed in some detail in the chapter on the progress of agriculture.

TABLE LXXI

DISTRIBUTION OF URBAN POPULATION AMONG TOWNS OF VARIOUS SIZES IN UPPER DOAB AND THE DIVISIONS OF THE STATE, 1951

District/ Region	Percentage of urban population living in the towns with a population of					
	100,000 & over	50,000 to 100,000	20,000 to 50,000	10,000 to 20,000	5,000 to 10,000	Under 5,000
1	2	3	4	5	6	7
Saharanpur	44.0	16.7	14.6	8.9	7.1	8.7
Muzaffarnagar	...	31.3	11.3	23.9	31.3	2.2
Meerut	46.7	...	18.6	16.5	13.7	4.5
Bulandshahr	...	...	42.8	21.0	23.0	12.2
Upper Doab	29.9	9.4	21.0	16.5	16.6	6.6
U.P.	39.1	12.0	16.2	11.8	14.7	6.2
Himalayan Div.	39.5	...	18.0	14.0	18.3	10.2
East Plain Div.	36.0	4.1	21.5	12.0	19.9	6.5
Central Plain Div.	62.9	3.4	14.6	6.8	7.3	5.0
West Plain Div.	29.9	19.4	15.2	13.0	16.6	5.9
Hills and Plateau	19.4	15.7	16.9	20.6	16.1	11.3

SOURCE: a) Figures for Upper Doab and its districts calculated from Table A-IV, District Census Handbooks, U.P., 1951.
b) Figures for U.P. and its natural divisions calculated from Census of India 1951 Vol.II, U.P., Part I-A-Report, p.156.

Table LXXII shows percentages of instantaneous growth[20] of urban population in Upper Doab and the State of U.P. from 1901 to 1951. From the table it will be seen that in the fifty-year period the class I towns recorded the highest increase of 223.0 per cent relative to the 1901 population. This was nearly 19 per cent above the State average of 204.4 per cent for the same period. The next highest increase was in towns of the III class with a population of 20,000 to 50,000. In this class, too, the increase of 169.4 per cent in Upper Doab was substantially high-er than the State average of 110.5 per cent. On the other hand the population of the towns of the V and VI categories suffered a loss of more 9 per cent on 1901 population. This pattern of variation was almost identical with the pattern of variation in the State. It will be seen from the table that in U.P. too, the highest increase occurred in the population of Class I towns and class III towns followed with the next highest percentage whereas the class VI towns suffered a loss of about 22 per cent on the 1901 total. The comparison in respect of class II towns is rather difficult to make. There was only a nominal increase of 3.5 per cent in the population of this category in the State whereas the corresponding increase in Upper Doab was very high being 83.4 per cent - easily the third highest in the region. But unlike the State, the variation in the population of class II towns has not been a continuous process. In the State the variation has followed a wavy

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20. There are two methods of measuring growth of urban population namely instantaneous and continuous. In the instantaneous method the urban growth is traced intercensally according to the size category of urban centres alone. The individual towns which make up the urban population are not considered. This measure indicates the relative significance of the towns of different size classes and shows the general trend of urban growth with reference to the magnitude of urban concentrations. The continuous method, on the other hand, is concerned with measuring the growth in the population of individual towns and cities. This method provides a measure of assessing what has been happen-ing to the specific towns and cities in the context of their size difference. Though by itself a valuable and suggestive index the second measure does also provide a corollary to the instantaneous measure of urban growth. See Davis Kingsley ' The Population of India and Pakistan p.128! Both of these methods are, therefore employed for the measurement of urban growth in the Upper Doab region. The application of the second method is, however, confined to cities only.

TABLE LXXII

PERCENTAGE OF INSTANTANEOUS GROWTH OF URBAN POPULATION ACCORDING TO THE SIZE OF TOWNS FROM 1901 to 1921

Class of town	1901-11	1911-21	1921-31	1931-41	1941-51	1901 to 1951
1	2	3	4	5	6	7
I-100,000 & Over Upper Doab	-1.6	- 5.5	+ 11.5	+ 103.0	+ 37.4	+ 223.0
U.P.	-2.7	+ 0.4	+ 22.3	+ 71.3	+ 49.2	+ 204
II-50,000 to 100,000 Upper Doab	- 5.0	- 0.9	+ 26.3	...	...	+ 83.4
U.P.	-14.9	+ 6.7	+ 13.3	- 3.9	+ 2.5	+ 3.5
III-20,000 to 50,000 Upper Doab	- 8.7	+26.2	+ 70.7	+63.2	- 5.5	+169.4
U.P.	-11.9	+ 7.2	+45.6	+32.5	+10.6	+110.5
IV-10,000 to 20,000 Upper Doab	-25,3	-13.5	+14.5	+18.6	+16.7	+24.1
U.P.	- 7.9	-14.4	+13.8	+ 9.1	- 0.03	+ 2011
V-5,000 to 10,000 Upper Doab	-11.7	-13.8	-9.8	+12.0	+12.7	- 9.2
U.P.	-14.7	+ 0.4	-3.6	+16.5	+11.8	+18.3
VI-Under 5,000 Upper Doab	- 1.9	+16.4	-6.0	-29.3	+21.1	-9.9
U.P.	- 1.8	+ 9.8	-11.2	-19.6	+10.6	-21.6

S O U R C E : Calculations for Upper Doab based on data from Census of India, N.W. Provinces and U.P., for 1901,1911,1921,1931,1941, and 1951, and for U.P. from Census of India 1951, U.P. Report, p.164.

curve with two troughs: one in the first decade and the second in the fourth. In Upper Doab on the contrary there was a break in the fourth decade as there was no town of class II in the region.

The most remarkable feature which is manifest from table LXXII is that 1941 was the year of Great Divide in the growth of the urban centres of Upper Doab in particular and the State in general. Upto 1931 the lower class towns were quite significant in the composition of urban population whereas the high class towns relatively less dominating. In fact the distribution of population among towns of various classes was comparatively smooth. But after 1931 and by the commencement of 1941 the lower class towns suffered heavily in respect of relative significance and the class I towns became toweringly dominant. Predominance of the urban non-city population of the earlier decades was replaced by a greater predominance of the urban city population at and after 1941. As has been pointed out earlier the tremendous growth of population of the bigger towns was, in part, due to sudden growth and expansion of industries under the impetus of the emergent and increasing war demands and, in part, to an unprecedented influx into the principal towns of the refugees from across the border after the partition of the subcontinent into two sovereign states in 1947.

It would be of interest to note that the natural increase had not been an effective factor in the growth of city population in the region. This fact is brought out statistically by table LXXIII. It will be seen from the table that the mean rate of natural increase was very small compared with the mean rate of growth of population in the individual cities as well as in the combined city population. In Saharanpur, for instance, the natural increase in the

combined population of the two cities of the district was less than a fifth of the mean growth-rate whereas the city of Hardwar recorded a natural decline of 3.2 per cent against a total growth at the rate of 33.6 per cent - incidentally the highest in the district. Similarly in Muzaffarnagar city the natural increase was less than 42 per cent of the mean growth-rate. Again in Ghaziabad the natural increase accounted for only about a fifth of the overall growth-rate. The city of Meerut, however, had a shade more than 52 per cent of its overall growth due to natural increase.

TABLE LXXIII

MEAN DECENNIAL VITAL RATES OF URBAN AND CITY POPULATION DURING THE DECADE 1941-51

Population of	Mean decennial rates of			
	Births	Deaths	Natural increase	Growth
1	2	3	4	5
		Saharanpur		
	%	%	%	%
1. all the towns	36.5	27.5	9.0	32.2
2. Saharanpur city	35.8	26.2	9.6	31.3
3. Hardwar city	30.5	33.7	- 3.2	33.6
4. the two cities combined	34.3	28.2	6.1	31.9
		Muzaffarnagar		
1. all the towns	34.6	18.6	16.0	16.0
2. Muzaffarnagar city	30.4	17.2	13.2	31.5
		Meerut		
1. all the towns	30.9	17.2	13.7	32.1
2. Meerut city	32.0	15.2	16.8	31.8
3. Ghaziabad	26.0	13.5	12.5	58.9
4. the two cities combined	31.1	14.9	16.2	35.0

Note: Bulandshahr district had no city in 1951.

SOURCE: Calculations based on data from Census of India 1951, Vol.II,U.P., Part I-B-Subsidiary Tables, pp.50-61.

The relatively small magnitude of natural increase was chiefly due to a rather steady decline in birth-rate of the city population relative to the rates obtained for the total urban population during the three decades from 1921 to 1950. The general health conditions got much improved in the cities after 1921 and the death-rates were consequently brought down to a somewhat lower level compared with the decline in the birth-rates. The reduction in the dealth-rates tended to raise the rate of natural increase and, had there not been a reduction in the birth-rates also, the population of the cities would have probably risen to a greater magnitude than what it attained in 1951. The check on birth-rates and the increasing masculinity of city population (discussed in detail in the chapter on sex-ratio) incumbent upon rural-urban migrations thus explains the paradox of low rates of natural increase with improved health conditions and rapidly declining death-rates.

The reduction in birth-rate of city population of Upper Doab was of special interest as it presented a contrast with the general trend in the State as a whole. Upto 1941 the birth-rates for the cities in the Upper Doab districts were generally higher than those for the overall urban population which included country-towns as well as larger cities. But within a span of one decade the position was reversed and the birth-rates for city population were on the whole surpassed by the birth-rates of the total urban population; in U.P. on the contrary the birth-rate in cities exceeded the total urban birth-rates in 1941-50. This intra-urban trend in natality-rates as brought out in table LXXIV was in fair harmony with the general rule that the birth-rates are lower in city centres than in urban areas.[21] But this trend was obtained only after the close

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21. The intra-urban trend of birth-rates has been observed in the American and European countries by Dudley Kirk in his book ' Europe's Population in the Inter-War Years'.

of the fourth decade upto which period the city birth-rates were higher than the total urban birth-rates in the Upper Doab districts also. This trend indicates the strong and increasing centrapetal force of the bigger cities which has lately been tending the population to concentrate more and more in bigger cities and thus widen the gap in the even continuum and heirarchy of town

TABLE LXXIV

MEAN DECENNIAL BIRTH-RATES FOR URBAN AND CITY POPULATION FOR THREE DECADES, 1921-50

District/ State	Specification of population	Mean decennial birth-rates during 1921-30	1931-40	1941-50
1	2	3	4	5
Saharanpur	Urban	33.5	38.7	36.5
	City	43.7	41.1	34.3
Muzaffarnagar	Urban	17.4	32.5	34.6
	City	33.7	37.1	30.4
Meerut	Urban	16.5	28.2	30.9
	City	23.9	30.1	31.1
U.P.	Urban	41.9	35.6	32.9
	City	39.9	40.7	34.2

S O U R C E : Calculations based on data from Census of India 1951,Vol.II, U.P., Part I-B-Subsidiary Tables, pp.50-61.

4. OCCUPATIONAL STRUCTURE OF TOWNS

The 1951 census has given a break up of the population of towns of each district into six major categories of livelihood classes. The six categories used in the census are:

I. Production other than cultivation

II. Commerce

III. Transport

IV. Other services and miscellaneous sources

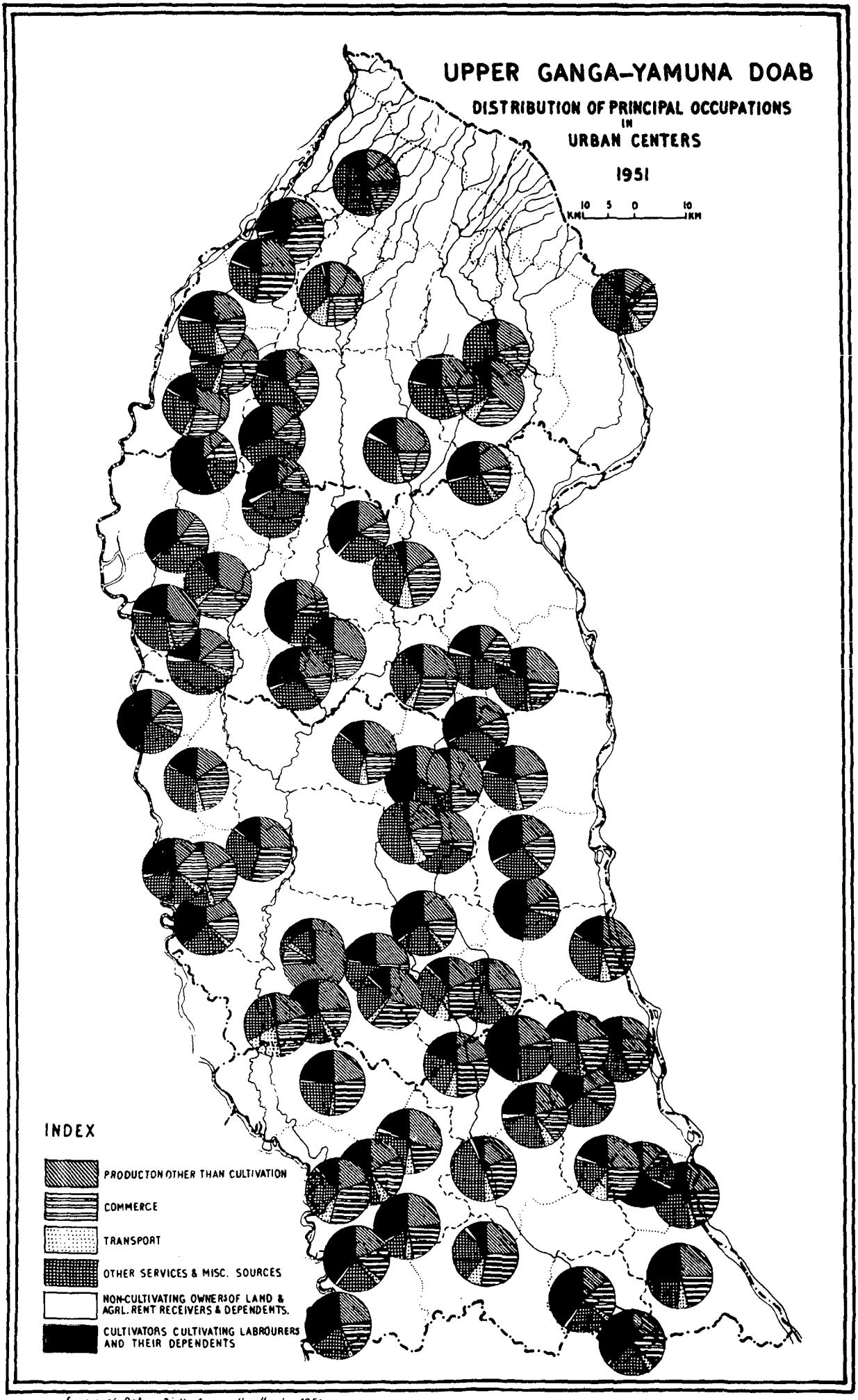
V. Non-cultivating owners of land, agricultural rent receivers and their dependents.

VI. Cultivators, cultivating labourers and their dependents.

As may be seen from tables LXXV, LXXVI, LXXVII, LXXVIII there was considerable variation in the percentages of the six livelihood classes in the population of the towns. From Fig. 55 it will be seen that each town had a share of each of these classes and it is, thus, extremely difficult to make any arbitrary classification of these towns on the basis of the occupation of the inhabitants. However, without any categorization or classification it is almost impossible to make a systematic analysis of the occupational structure of the towns. For the purpose of the present study, therefore, a statistical method based on an empirical formula evolved by the author has been used.[22] Algebraically the formula may be written as:

$$\partial = \sqrt{\frac{\Sigma D_p^2 - \Sigma D_n^2}{N^2}}$$

22. Rafiullah, S.M. " A New Approach to the Functional Classification of Towns". The Geographer, Vol.XI, 1965, pp.40-53. A brief summary of the working of the formula is given in AppendixIII.



Source of Data : Distt. Census Handbooks 1951

FIG. 55

TABLE LXXV

TOWNS OF SAHARANPUR DISTRICT WITH PERCENTAGE OF POPULATION BY LIVELIHOOD CLASSES, 1951

Town	I Production other than cultivation	II Commerce	III Transport	IV Other services and miscellaneous sources.	V Non-cultivating owners of land; agricultural rent receivers; and their dependents.	VI Cultivator cultivatin labourers and their dependents
1	2	3	4	5	6	7
	%	%	%	%	%	%
Saharanpur	26.0	26.0	11.0	33.0	1.0	3.0
Hardwar	18.0	22.0	5.0	49.0	1.0	4
Deoband	26.0	21.0	4.0	32.0	1.0	16.0
Roorkee	25.0	20.0	4.0	45.0	1.0	5.0
Gangoh	33.0	22.0	4.0	24.0	1.0	16.0
Manglaur	34.0	25.0	6.0	23.0	1.0	11.0
Rampur	17.0	22.0	2.0	39.0	1.0	19.0
Nakur	21.0	22.0	5.0	27.0	4.0	21.0
Sultanpur	17.0	14.0	2.0	13.0	3.0	13.0
Behat	24.0	21.0	2.0	42.0	0.0	11.0
Ambehta	25.0	27.0	4.0	17.0	1.0	26.0
Nananta	13.0	18.0	0.0	37.0	2.0	30.0
Titron	13.0	11.0	3.0	17.0	1.0	55.0
Sarsawa	26.0	28.0	1.0	25.0	2.0	18.0
Jhabrera	24.0	19.0	2.0	32.0	2.0	21.0

S O U R C E : Calculations based on data from District Census Handbook of Saharanpur, 1951, Table A-V.

TABLE LXXVI

TOWNS OF MUZAFFARNAGAR DISTRICT WITH PERCENTAGE OF POPULATION BY LIVELIHOOD CLASSES, 1951

Town	I Production other than cultivation	II Commerce	III Transport	IV Other services and Miscellaneous sources.	V Non-cultivating owners of land; agricultural rent receivers; and their dependents.	VI Cultivators, cultivating labourers, and their dependents.
1	2	3	4	5	6	7
	%	%	%	%	%	%
Muzaffarnagar	17.0	31.0	7.0	38.0	1.5	5.5
Kairana	28.0	18.0	3.0	28.0	1.0	21.0
Shamli	30.0	31.0	4.0	23.0	1.0	11.0
Khatauli	26.0	29.0	5.0	30.0	0.0	10.0
Kandhla	14.0	16.0	3.0	41.0	3.0	23.0
Thana Bhawan	17.5	17.5	1.5	38.0	0.5	25.0
Chartawal	17.0	14.0	1.0	30.0	1.0	38.0
Miranpur	28.0	19.0	2.0	33.0	2.0	16.0
Pur Qazi	21.0	19.0	3.5	28.0	1.5	27.0
Sisauli	17.0	10.0	1.0	26.0	0.0	46.0
Jalalabad	12.0	18.0	1.0	36.0	2.0	31.0
Budhana	23.0	15.0	1.0	30.0	1.0	30.0
Jansath	11.0	17.0	2.0	49.0	2.0	19.0
Jhinjhana	12.0	19.0	1.0	34.0	1.0	33.0
Shahpur	31.0	19.0	1.5	32.0	0.5	16.0

S O U R C E : Calculations based on data from District Census Handbook of Muzaffarnagar 1951, Table A-V.

TABLE LXXVII

TOWNS OF MEERUT DISTRICT WITH PERCENTAGES OF POPULATION BY LIVELIHOOD CLASSES, 1951.

Town	I Production other than cultivation	II Commerce	III Transport	IV Other services and Miscellaneous	V Non-cultivating owners of land; agricultural rent receivers and their dependents.	VI Cultivators, cultivating labourers and their dependents.
1	2	3	4	5	6	7
	%	%	%	%	%	%
Meerut	20.0	22.0	7.0	48.0	0.5	2.5
Hapur	19.0	31.0	9.0	29.0	1.0	11.0
Ghaziabad	20.0	28.0	20.0	29.0	1.0	2.0
Baraut	16.0	30.0	3.0	31.0	8.0	17.0
Mawana	21.0	23.0	4.0	28.0	1.0	23.0
Khekra	21.0	16.0	2.0	24.0	1.0	36.0
Sardhana	27.0	22.0	3.5	33.0	0.5	14.0
Modinagar	74.0	9.0	3.0	13.0	0.0	1.0
Pilkhua	31.0	30.0	3.0	23.0	1.0	12.0
Chhapraull	13.0	16.0	3.5	30.0	1.5	36.0
Kithore	18.0	9.0	3.0	22.0	1.0	47.0
Garhmuktesar	23.0	23.0	6.0	30.0	0.0	18.0
Kanker Khera	27.0	17.0	4.0	34.0	1.0	17.0
Moradnagar	26.0	24.0	3.5	30.0	0.5	16.0
Lawar	34.0	16.0	0.0	24.0	0.0	26.0
Faridnagar	26.0	15.0	0.5	36.0	0.5	22.0
Baghpat	13.0	21.0	4.0	34.0	0.0	28.0
Phalanda	20.0	15.0	0.5	33.0	0.5	31.0
Parichhatgarh	17.0	19.0	3.0	28.0	1.0	32.0
Daurala	33.0	4.0	1.0	14.0	1.0	47.0

1	2	3	4	5	6	7
Tatiri	17.5	25.0	2.5	22.0	0.0	23.0
Kharkhanda	22.0	15.0	4.0	23.0	1.0	35.0
Aminnagar Sarai	24.0	30.0	0.0	30.0	1.0	15.0
Abdullahpur	25.0	8.0	0.0	45.0	2.0	20.0
Dasna	24.0	18.0	4.0	21.0	0.0	33.0
Baksar Khera	41.0	6.0	4.0	44.0	0.0	5.0
Babugarh	23.0	11.0	4.0	58.0	1.0	3.0

S O U R C E : Calculations based on data from District Census Handbook of Meerut 1951, Table A-V.

TABLE LXXVIII

TOWNS OF BULANDSHAHR DISTRICT WITH PERCENTAGE OF POPULATION BY LIVELIHOOD CLASSES, 1951

Towns	I Production other than cultivation	II Commerce	III Transport	IV Other Services and Miscellaneous sources.	V Non-cultivating owners of land; agricultural rent receivers; and their dependents.	VI Cultivators cultivating labourers and their dependents.
1	2	3	4	5	6	7
	%	%	%	%	%	%
Khurja	24.0	28.0	9.0	42.5	8.0	2.0
Bulandshahr	18.0	26.0	5.6	20.0	1.6	6.3
Sikandarabad	26.0	25.0	9.0	20.4	1.0	19.0
Jahangirabad	25.6	25.5	9	21.2	1.1	18.5
Dibai	25.5	20.3	5.3	21.2	0.6	27.2
Shikarpur	30.0	16.5	4.6	28.2	1.7	19.3
Siana	20.8	23.8	3.2	27.8	2.6	21.8
Gulaothi	21.0	29.0	7.0	26.0	1.0	17.0
Anupshahr	21.0	24.0	4.0	36.0	1.0	15.0
Jewar	23.0	20.0	2.0	20.0	1.0	35.0
Dadri	23.0	28.0	3.0	24.0	1.0	22.0
Aurangabad	21.0	19.0	5.0	28.0	2.0	24.0
Khanpur Gantu	19.0	14.0	0.5	28.0	0.5	38.0
Rabipura	19.0	18.0	3.0	21.0	1.0	38.0
Pahasu	14.0	20.0	3.0	42.0	0.5	21.0
Bugrasi	27.0	18.0	1.0	31.0	2.0	22.0
Khalaur	11.0	4.0	0.3	15.0	1.7	68.0
Saidpur	21.0	4.0	0.2	25.0	1.3	48.0
Chhatari	17.0	21.0	3.0	22.0	1.0	36.0
Dankaur	20.0	34.0	7.0	26.0	1.0	12.0
Bilaspur	17.0	23.0	5.0	25.0	0.0	30.0
Kakore	24.0	24.0	3.0	14.0	1.0	34.0

SOURCE: Calculations based on data from District Census Handbook of Bulandshahr 1951, Table A-V.

where ∂ is the standard deviation, D_p and D_n positive and negative deviations respectively and N the number of elements. By this formula the critical combination of the livelihood classes of all the eighty towns of the region have been calculated and the results are tabulated in table LXXIX. It will be seen from the table that in 1951 the towns of the region were predominantly quadrinomial. Almost sixty-nine per cent of the towns belonged to this category. Trinomial towns which accounted for slightly more than twenty-seven per cent occupied the second place whereas the binomial and monomial towns[23] had very small percentages of about' two ' and 'one' respectively. This indicates that the degree of specialization in livelihood classes and occupations was not much developed in the towns of the region. Table LXXIX shows that there were only four occupational classes categorized under the marks IV; I; II and VI (arranged in descending order of frequency) which were most predominantly and, also, quite evenly pursued by the inhabitants of the towns. The categories of occupations marked III and V were most conspicuous by their extremely insignificant relative position in the occupational structure of the region's population.

TABLE LXXIX

AGGREGATE PERCENTAL FREQUENCY OF OCCURRENCE OF THE DIFFERENT LIVELIHOOD CLASSES IN THE UPPER DOAB TOWNS, 1951

Livelihood class	Frequency	Livelihood	Frequency
	%		%
IV	26.6	VI	21.8
I	25.8	III	00.4
II	25.4	V	00.0

23. The details of this nomenclature are given in Appendix III.

Among the quadrinomial towns eighteen different combinations have been found. However, in the majority of the towns of this class occupation No. IV, namely other services and miscellaneous sources appeared in the first place of the critical combination defining the typical functional class of the town. Such towns accounted for fifty-four per cent of the total quadrinomial towns. Towns with purely agricultural occupations (livelihood class No.VI) in the first place of the combination stood in the second place of frequency with a percentage of about twenty-five. The third place was occupied by the towns in which occupation No.II (commerce) was in the first place of the combination. The percentage frequency of such towns was about fourteen. The details of all the eighteen combinations with the name of towns are given in table LXXX.

Seven different combinations were found among the trinomial towns. Predominance of occupation No.IV was more striking in these towns. This class of livelihood occurred in the first place of combinations of fourteen of the twenty trinomial towns giving a percentage of seventy. Only three towns (or fifteen per cent) had a predominantly agricultural structure with occupation No.VI occurring in the first place of their combinations. Commerce was the next important means of livelihood and occurred in the second place of combinations of the nine (or forty-five per cent) towns. The details of the actual combinations of all the twenty trinomial towns are given in table LXXXI.

Each of the three binomial towns had a different combination. In the two of these three towns the agricultural occupation No.VI occurred in the first place of the combination whereas 'other services and miscellaneous sources' (occupation No.IV) occupied the first place in the combination of the third town. The second place in the combinations was occupied by 'production other

TABLE LXXX

DETAILS OF OCCUPATIONAL COMBINATION IN THE QUADRINOMIAL TOWNS
1951

Combination	Town	District
(IV, VI, I, II)	Aurangabad	Bulandshahr
	Phalauda	Meerut
	Thana Bhawan, Pur Qazi, Budhana	Muzaffarnagar
(IV, VI, II, I)	Pahasu	Bulandshahr
	Parichhatgarh	Meerut
	Kandhla, Jansath	Muzaffarnagar
(IV, I, VI, II)	Bugrasi	Bulandshar
	Faridnagar	Meerut
	Kairana	Muzaffarnagar
	Jhabrera	Saharanpur
(IV, II, I, VI)	Anupshahr	Bulandshahr
	Aminnagar Sarai	Meerut
	Nakur	Saharanpur
(IV, II, VI, I)	Siana	Bulandshahr
	Baraut; Mawana	Meerut
	Rampur	Saharanpur
(IV, I,II, VI)	Sardhana; Garhmuktesar	Meerut
	Muradnagar	
	Miranpur; Shahpur	Muzaffarnagar
	Deoband	Saharanpur
(IV, II, I, III)	Ghaziabad	Meerut
(VI, IV, I, II)	Khanpur, Rabupura	Bulandshahr
	Khekra, Kharkhauda	Meerut
	Chartawal	Muzaffarnagar
	Titron	Saharanpur
(VI, IV,II, I)	Chhatari, Bilaspur	Bulandshahr
	Chhaprauli	Meerut
(VI, I, IV, II)	Dibai	Bulandshahr
	Dasna	Meerut
(VI, I, II, IV)	Jewar, Kakore	Bulandshahr

(II, IV, I, VI)	Gulaothi, Dadri, Dankaur Hapur	Bulandshahr Meerut
(II, VI, I, IV)	Sultanpur, Ambehta	Saharanpur
(II, I, IV, VI)	Sarsawa	Saharanpur
(II, VI, IV, I)	Tatiri	Meerut
(I, IV, VI, II)	Shikarpur	Bulandshahr
(I, II, IV, VI)	Jahangirabad; Sikandarabad	Bulandshahr
(I, VI, IV, II)	Lawar	Meerut
(I, IV, II, VI)	Gangoh	Saharanpur

S O U R C E : Calculations based on data from District Census Handbooks, U.P. 1951. p.9.

TABLE LXXXI

DETAILS OF THE OCCUPATIONAL COMBINATIONS IN THE TRINOMIAL TOWNS, 1951

Combination	Town	District
(IV, II, I)	Bulandshahr, Khurja Meerut Khatauli Saharanpur, Hardwar	Bulandshahr Meerut Muzaffarnagar Saharanpur
(IV, VI, II)	Baghpat Jalalabad, Jhinjhana Nanauta	Meerut Muzaffarnagar Saharanpur
(IV, I, II)	Roorkee, Behat	Saharanpur
(IV, I, VI)	Abdullahnagar	Meerut
(VI, IV, I)	Saidpur Kithore Sisauli	Bulandshahr Meerut Muzaffarnagar
(I, II, IV)	Pilkhua Manglaur	Meerut Saharanpur
(II, I, IV)	Shamli	Muzaffarnagar

SOURCE: Calculations based on data from District Census Handbooks, U.P. 1951, p.9.

than cultivation' (occupation No.I) in two towns and occupation No.IV in one town. There was only one monomial town in the whole of the Upper Doab and ' production other than cultivation' was the critical or defining function. The combinational details of the binomial towns are set out in table LXXXII.

TABLE LXXXII

DETAILS OF OCCUPATIONAL COMBINATIONS IN THE BINOMIAL TOWNS, 1951

Combination	Town	District
(VI , I)	Daurala	Meerut
(IV , I)	Babugarh	Meerut
(VI , IV)	Khalaur	Bulandshahr

S O U R C E : Calculations based on data from District Census Handbooks U.P. 1951, p.9.

Table LXXXIII gives details of the absolute frequencies of occurrence of different occupations according to their ranks in the combinations. It will be seen from the table that occupation No. IV had the highest first place frequency of 44 while its second-place frequency of 18 was only one short of the second highest in that place. The occupation No.VI which had the second highest frequency of 17 in the first place had almost the same frequency of occurrence in the second and fourth places. Occupation No.V did not appear in any combination whereas occupation No.III figured only once and that too in the fourth place of the combination. Though the occupations No.I and II did not have a high frequency in the first place they were, however, quite prominent in the subsequent places. The former had the highest frequency in the third pla and the latter led in the fourth place of occurrence.

TABLE LXXXIII

ABSOLUTE FREQUENCIES OF OCCURRENCE OF VARIOUS LIVELIHOOD CLASSES IN THE TOWNS, 1951.

Livelihood class	Frequency of occurrence in the I Place	II Place	III Place	IV Place	Total
1	2	3	4	5	6
I	8	23	31	11	73
II	8	19	23	21	71
III	0	0	0	1	1
IV	44	18	9	4	75
V	0	0	0	0	0
VI	17	16	11	17	61
Total	77	76	74	54	281

S O U R C E : Calculated from tables LXXX, LXXXI, and LXXXII.

This analysis shows that miscellaneous services and sources not dealing with production either from cultivation or other than cultivation were the most outstanding occupation of the urban people of the region. Agricultural pursuits and commerce were next in importance in that order. Another point of note is the agricultural base of the majority of the towns. Highly uniform occurrence of the VIth occupation in various places of combinations is indicative of this character. Besides, its occurrence in the combinations of 61 of the 80 towns also indicates high degree of agrarian character of the towns. The relative frequencies of occupations at different places shown in table LXXXIII may be better appreciated from the table LXXXIV giving percentages of these frequencies arranged in the descending order in respect of first place frequency.

TABLE LXXXIV

PERCENTAL FREQUENCY OF OCCURRENCE OF LIVELIHOOD CLASSES IN DIFFERENT PLACES OF THE COMBINATIONS, 1951.

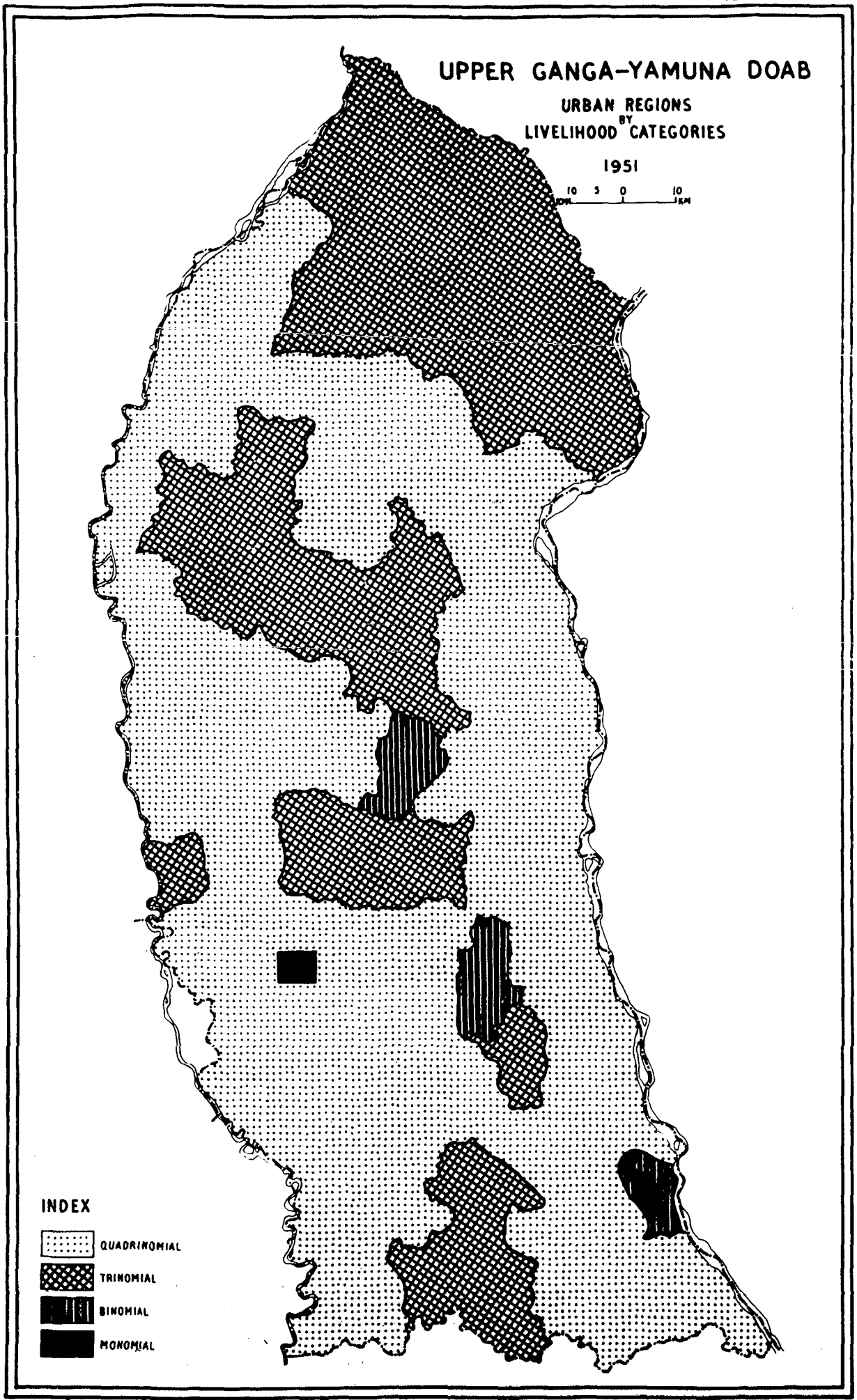
Livelihood Class	Percentage of frequency of occurrence in			
	I place	II Place	III place	IV place
1	2	3	4	5
IV	56.7	24.7	11.3	7.5
VI	23.0	21.9	14.0	29.9
II	10.8	24.7	31.0	39.9
I	9.5	28.7	43.7	20.8
III	00.0	00.0	00.0	1.9
V	00.0	00.0	00.0	00.0

S O U R C E : Calculations based on data from District Census Handbooks, U.P. 1951, p.9.

A division of Upper Doab into regions based on occupational structure of the towns has been attempted in Fig.56. The method of nodal regions has been used in the preparation of this map.[24] The map indicates that the quadrinomial town regions generally followed the two major rivers - Ganga and Yamuna. The region of trinomial towns mainly occupied the middle parts of Upper Doab. All the four sadar tahsils and parganas belonged to the trinomial town region. The binomial and monomial town regions were almost entirely in the Meerut district.

The general pattern of distribution of the livelihood classes that emerges from the map is that miscellaneous services and sources and the agrarian professions were mainly concentrated in the belts either along the Ganga khadir specially in the Meerut district or along the middle and southern section of the Yamuna Khadir in the districts of Muzaffarnagar, Meerut and Bulandshahr. The urban population of the parganas in and near the Ganga Khadir (from Purchapur in Muzaffarnagar tahsil to Siana in Bulandshahr tahsil) was engaged primarily in miscellaneous services and secondarily in agricultural occupations whereas the south-western parganas of Bulandshahr had agriculture as the primary occupation and the services as secondary. Similarly the western parganas of Bidauli, Kairana, Kandhla, Chhaprauli and major portion of Baghpat constituted another belt of quadrinomial towns in which services formed the primary occupation and cultivation and allied agrarian pursuits the next important means of livelihood. It may be noted here that in eastern and western

24. The map has been drawn first by plotting the towns in their respective parganas and inserting the denomination of their occupational category. Then each town (or towns if there are more than one of the same category in the same pargana) is considered as the centre of intense concentration of the urban functions of the pargana in which it is situated. The pargana boundaries are then adopted as the peripheral boundaries of the region of the particular occupational structure of the urban population. In those cases where more than one town with different occupational structure happened to be situated in the same pargana the peripheral boundaries are drawn by dividing the pargana in proportionate divisions according to both the number of towns and the vicinal symmetry. In Upper Doab only three such cases were encountered.



Source of Data: Distt Census Handbooks 1951

FIG. 56

parganas of Meerut and Muzaffarnagar the element of gujars - the cattle raisers and grazers - was much more important than it was in any other similarly large section of Upper Doab. The younger generation of the gujars would not generally like to lead a semi - nomadic life of the pastoralist and would, therefore, prefer to live a sedentary life in a town and earn their livelihood by getting themselves occupied in miscellaneous services. Besides, a similar psychology has also been working among the younger elements of the rural population. They also prefer to live in towns rather than to work in the fields. Since they do not possess any special professional training the only line of occupation open before them is that of miscellaneous and private services. It may be pointed out here that the miscellaneous services in the context of small towns do not refer to the sophesticated government or other executive and judiciary services or services of some recognized and well established institution. But, since the small towns, as noted earlier, had an initial rural base, the percentage of population engaged in agricultural occupations was significantly high in almost every small quadrinomial town with services at the top of the combination.

The parganas of Nakur tahsil formed another distinct belt of quadrinomial towns in which commerce was the leading occupation among the four critical occupations defining the livelihood pattern and structure of the towns. This relative predominance was probably a reflex of the vicinity to the submontane area of Upper Doab. Major part of the Saharanpur district contained wide stretches of forests the products of which were sent to far and wide. This seems to be the plausible explanation of the predominance of commerce in towns of this belt. Besides the towns situated near the submon-tane areas the II occupation i.e. commerce was also prominent in those towns which were important mundis or supply centres of grains or other agricultural

products. Hapur was one of the best examples of such towns. For this reason probably the parganas of Hapur, Gulaothi, Dadri and Dankaur constituted a second belt of quadrinomial towns with commerce at the head of their occupational combinations. But, again, it will be seen that both the services and the agricultural occupations generally held either the second or the third place in the combinations of these towns.

Trinomial towns, representing a step further towards specialization in occupation, developed in or around the sadar parganas and tahsils. This is a purely administrative cause but it was real. The district headquarters and the pargana and the tahsil which contained them had the advantage of having better transport, industrial, and commercial services than those which were available in smaller towns farther away and offthe main lines of transport. Such advantages and facilities provided opportunity for specialization in non-agricultural pursuits and thus the trinomial towns formed belts between the laterally flanking belts of the quadrinomial towns and in close vicinity to the headquarters of the tahsils or the districts.

Binomial towns represented relatively high degree of specialization. In Upper Doab there were only three binomial towns and of these Daurala and Babugarh in the parganas of Daurala and Hapur were big centres of sugar industry and poultry farming respectively. The third binomial town of Khalaur represented a very unique case of specalization. In this town almost 68 per cen of the population was engaged in purely agricultural occupations of either actual cultivation or of agricultural labour. If this specialization in rural occupations will continue upto the next census it is most probable that the cens authorities would have to give a second thought to the propriety of Khalaur's inclusion in the list of the towns.

CHAPTER VII

SEX - RATIO

1. GENERAL

The sex structure of the Upper Doab population has been very remarkable for a high deficiency of females which has been generally increasing from decade to decade since 1901. The relatively high masculinity of the population may be construed to pre suppose availability of greater number of workers and higher incidence of female mortality. The first is self evident. Obviously the number of workers available would be higher if the proportion of males is higher than that of females. The latter presupposition is, however, to be examined on the merit of the existing facts although it is considered as a general feature of the dynamism of population that the female death-rate is usually lower than the death-rate among the males.

Table LXXXV indicates that Upper Doab has not only been chronically suffering from a female deficiency but had also the lowest female proportion among various States of the country in 1951. When the comparison is extended to international scale it is found that the female population in Upper Doab in 1951 was considerably lower than the lowest proportion of 885 per mile recorded in Ceylon in 1946. Though it may not appear very proper to draw comparison between two areas of vastly differing extent and circumstance but, nevertheless, such comparisons may help appreciate the relative situation of sex-ratio in a world-wide perspective. It is with this view that the sex-ratios of certain countries of the world are tabulated in table LXXXVI. The countries are arranged

TABLE LXXXV

FEMALES FOR THOUSAND MALES IN UPPER DOAB AND OTHER STATES OF INDIA, 1901-1951

State	1901	1911	1921	1931	1941	1951
1	2	3	4	5	6	7
Upper Doab	878	849	850	843	847	842
U.P.	937	915	909	904	907	910
India	972	964	956	951	946	947
Assam	934	929	910	889	889	879
Bihar	1052	1041	1015	993	995	989
Bombay	963	949	935	936	935	932
M.P.	1019	1008	1002	999	996	993
Madras	1028	1030	1024	1021	1010	1006
Orissa	1037	1056	1086	1067	1053	1022
Punjab	855	814	828	834	855	863
W. Bengal	943	921	900	885	845	859

S O U R C E : Upper Doab figures from Provincial Tables, Census of India, U.P. 1901,1911,1921,1931,1941, and 1951.
Figures for other States from Census of India 1951, Vol.II, U.P. Part I-A Report P.325.

TABLE LXXXVI

POPULATION BY SEX AND SEX-RATIO OF SOME SELECTED COUNTRIES OF THE WORLD

Region/Country	Year	Males	Females	Females per 1000 males
Upper G-U.Doab	1951	3,451,350	2,905,155	842
Ceylon	1946	3,532,218	3,125,121	885
Malaya	1947	2,579,976	2,298,462	891
Argentina	1947	8,145,175	7,748,652	951
Nepal	1941	3,206,104	3,075,742	959
Canada	1950	7,030,300	6,790,700	966
Union of S. Africa	1946	1,194,625	1,178,024	986
Australia	1947	3,797,370	3,781,988	996
Korea	1944	12,521,173	12,599,001	1,006
U.S.A.	1950	75,439,000	76,333,000	1,012
Belgium	1950	4,253,652	4,385,717	1,031
Japan	1950	40,740,000	42,370,000	1,040
Italy	1949	22,428,923	23,567,232	1,051
England & Wales	1950	21,169,000	22,661,000	1,070
France	1950	20,200,000	21,734,000	1,076
Germany	1950	22,505,300	25,106,900	1,116

S O U R C E : United Nation's Demographic Year Book, 1950-51.

Note: Only those countries have been included in the table for which the statistics for a year of the forties are available.

in ascending order of female-ratios. The figures in the table are self-explana-tory and require no elucidation. However it may, incidentally, be noted that in the emigrant countries such as Germany, France and Britain the male-female ratio was in favour of the females whereas in the immigrant countries such as Argentina, Canada, and South Africa this ratio was in favour of the males. Similarly the female proportion was high in countries that were hard hit by the second world war. This seems to be the plausible explanation of the greatest excess of females over males in Germany in Europe and in Japan in Asia.

In Upper Doab the conditions were different. Neither the migrations nor some major catestrophe selective of taking toll of a particular sex have been operative in determining the sex-ratio in this region. The particular ratio between the two sexes has rather been chiefly an outcome of differential rates of births and deaths among males and females. Table LXXXVII shows the natality and mortality rates (in total population and in reproductive age groups) of males and females for each year of the decade 1941-50 in each of the four districts of the region. It will be seen from the table that the birth-rate of females has been lower than that of the males throughout the decade in all the districts while the death-rate has generally been higher than the male death-rate. This process of natural decline in the number of females is more strikingly brought out by the actual number of female deaths at the child-bearing age-group which, according to the Indian Census authorities ranges between 15 and 40 years. Taking Upper Doab as a whole the female deaths at this age-group during the decennium 1941-50 numbered 95,691 against the corresponding male deaths of 81,276. This meant a total loss of 14,415 females in a period of ten years over the male population at the prime age of

TABLE LXXXVII

SEX-WISE SINGLE YEAR BIRTH AND DEATH-RATES AND DEATHS AT THE CHILD BEARING AGE-GROUP DURING THE DECADE 1941-50

Particulars		1941	1942	1943	1944	1945	1946	1947	1948	1949	195
1		2	3	4	5	6	7	8	9	10	11
BIRTH-RATES		%	%	%	%	%	%	%	%	%	%
Saharanpur	M	21.2	19.6	15.7	15.7	17.8	16.1	16.4	15.5	17.0	15.8
	F	18.8	17.4	13.8	13.8	15.4	13.6	14.0	13.3	14.4	13.8
Muzaffar-	M	21.4	17.3	14.6	15.4	16.2	14.9	14.6	13.6	29.1	13.2
-nagar	F	18.7	15.2	12.0	13.2	13.7	12.9	12.7	11.2	22.8	10.6
Meerut	M	20.9	18.6	15.2	17.1	17.7	16.9	16.1	15.2	11.7	15.4
	F	17.6	15.6	12.7	14.3	14.8	13.8	13.0	12.1	9.5	11.9
Bulandshahr	M	22.8	19.7	15.4	17.2	20.4	16.9	17.6	17.4	17.0	16.3
	F	19.7	16.9	13.3	14.3	17.3	14.2	14.9	14.1	13.8	13.4
DEATH-RATES (Total)											
Saharanpur	M	22.8	27.5	27.2	27.7	21.1	17.1	18.8	15.4	15.8	18.6
	F	24.6	32.2	30.7	31.3	23.1	18.5	20.3	16.7	16.7	20.6
Muzaffar-	M	18.6	19.9	20.8	17.8	18.7	13.0	17.1	10.6	11.7	13.3
-nagar	F	19.1	21.5	20.8	18.1	17.3	12.7	19.1	10.8	11.5	13.1
Meerut	M	21.4	21.3	21.5	22.1	17.5	13.4	15.9	11.3	13.1	15.7
	F	21.8	23.0	22.1	22.1	16.9	12.8	15.7	10.4	11.8	14.6
Buland-	M	24.5	20.5	24.4	27.8	19.1	18.0	18.9	16.4	16.6	21.5
-shahr	F	23.9	20.0	24.4	26.7	19.9	16.7	16.8	14.5	14.0	18.2
DEATHS AT THE AGE-GROUP OF 15-40 YRS.											
Saharanpur	M	2170	2227	3003	4205	2496	2057	2393	1979	1889	2041
	F	2572	3253	3402	4377	3884	2188	2488	2053	1936	2146
Muzaffar-	M	1184	1324	1767	1660	1695	1290	2377	1221	1240	1284
-nagar	F	1545	1679	1968	1714	1976	1485	2442	1252	1226	1223
Meerut	M	2511	2318	2794	2926	2678	2202	2135	1860	2261	2140
	F	3234	3280	3256	3125	3224	2337	2356	1931	2179	2543
Bulandsha	M	1552	1446	1896	2480	2080	1720	1783	1686	1620	1680
-hr.	F	2171	2024	3532	3943	2517	2009	1870	1819	1747	1781

SOURCE: Calculations based on data from District Census Handbooks of Saharanpur, Muzaffarnagar, Meerut and Bulandshahr 1951, part III, Miscellaneous statistics.

15 to 40 years. This clearly indicates that the survival expectancy at the productive age-group was considerably low among the females. This low survival rate was one of main factors responsible for the turn of the balance of sex-ratio in favour of males. The female deficiency would have probably been more aggravated had it not been countered to some extent by relatively low female mortality at the two extreme age-group of under 15 years and above 50 years. This particular pattern of mortality and survival expectancy among males and females at the three age-groups leaves no doubt about the fact that the overall higher death-rates in the female population was caused by high incidence of maternity deaths - a cause exclusively applicable to females. It might, therefore, be expected that with large scale availability of improved gynaecological and maternity services the steadily growing female deficiency (table LXXXV) might be stopped from further deterioration.

* * *

That the male births are more frequent than female births is a universal fact and still a medical myth. Blunt has very rightly called the question of the causation of sex " a <u>vexata quaestio</u> " which many have answered to their own satisfaction and nobody elses." To all the views which he has briefly mentioned[1] may be added the findings of the recent researches which indicate that the sex of the faetus is determined by the male alone. The female ovaries contain eggs which have only female-producing 'x' chromosomes whereas the sperm contains both 'x' and male-producing 'Y' chromosomes[2]. The 'Y' chromosomes are smaller and faster and, therefore, the probability of male-conception is

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1. Blunt, E.A.H. Census of India 1911, Vol.XV. U.P. of Agra and Oudh Part I Report, page 197 <u>et seq</u>.

2. Ratcliff, J.D., " New Facts About Human Reproduction", Readers' Digest March 1967, pp.105-108.

congenitally higher than that of a female-conception. The point may not releven -tly be diluted upon any further but, nevertheless, it may be noted that the sex-ratio at least by birth is destined to be in favour of the males. This is exactly what the vital statistics for the Upper Doab districts indicate. It will be seen from table LXXXV that in each of the four districts the female birth-rate were in defect by a little over two per thousand relative to the male birth rates in each year of the decade without a single exception. A close examination of the birth-rates reveals that there has been not even the slightest improvement in the quantum of defect in female birth-rates with the passage of time. The improvements in the sanitary and medical facilities as evidenced by a gradual reduction in death-rates seem to have proved quite ineffective in changing or modifying the seemingly rigid law of human genesis of a relatively high incidence of male-births. This state of trend is clearly in favour of a relatively high growth of male population.

* * *

However, the trend of death-rates as indicated by table LXXXVI seems to have countered to some extent, the effect of differential birth-rates on the dynamism of the sex-ratio. In the later years of the decade the female death-rates were generally lower than the male death-rates especially in Meerut and Bulandshahr districts. Saharanpur was the only district in which the female death-rates were higher throughout the decade. This shows that though the conditions have actually been doubly unfavourable for the growth of female population in Saharanpur district the state of affairs in Upper Doab as a whole was relatively less unfavourable for the growth of female population.

2. REGIONAL DISTRIBUTION

The regional distribution of sex-ratio by tahsils as statistically brought out in table LXXXVIII for the six census years and graphically illustrated in Fig.57 shows more or less the same pattern of variation from west to east and north to south as has been noticed in several other aspects of Upper Doab's population. In fact this west to east pattern is rather a normal sequences of variations in the State as a whole and the variation patterns in Upper Doab region seem to have conformed with this State norm in many a respect. It will be observed from the table that some of the highest female proportions were recorded in the eastern and southern tahsils. Khurja tahsil had the highest proportion of 975 females per 1,000 males in Upper Doab in 1941 while other high proportions were recorded in the eastern tahsils of Anupshahr and Bulandshahr, the lowest proportions were returned for Sikandarabad which is the western most tahsil of Bulandshahr district. Similarly the two eastern tahsils of Mawana and Hapur had the highest female ratios in the district of Meerut. On the contrary the lowest female ratios were reported from the western tahsils of Baghpat and Ghaziabad. The Meerut tahsil should, however, be considered as a special case for it contains both the district and the division headquarters which is, incidentally, the largest city of the region and as such the effect of urbanism, which will be discussed later on, has been the real determinant of the sex-ratio in the tahsil. Though a similar trend was also found in Muzaffarnagar district but there it was comparatively less marked and more subdued. Kairana, the western most tahsil, had the lowest sex-ratio after Muzaffarnagar tahsil in 1951 whereas the highest ratio was recorded in the eastern most tahsil of Jansath in that census. Muzaffarnagar, like Meerut, was an exceptional case for being the sadar tahsil carrying

TABLE LXXXVIII
FEMALES PER THOUSAND MALES IN UPPER DOAB
BY TAHSILS AND IN THE STATE FOR SIX CENSUSES
1901-1951

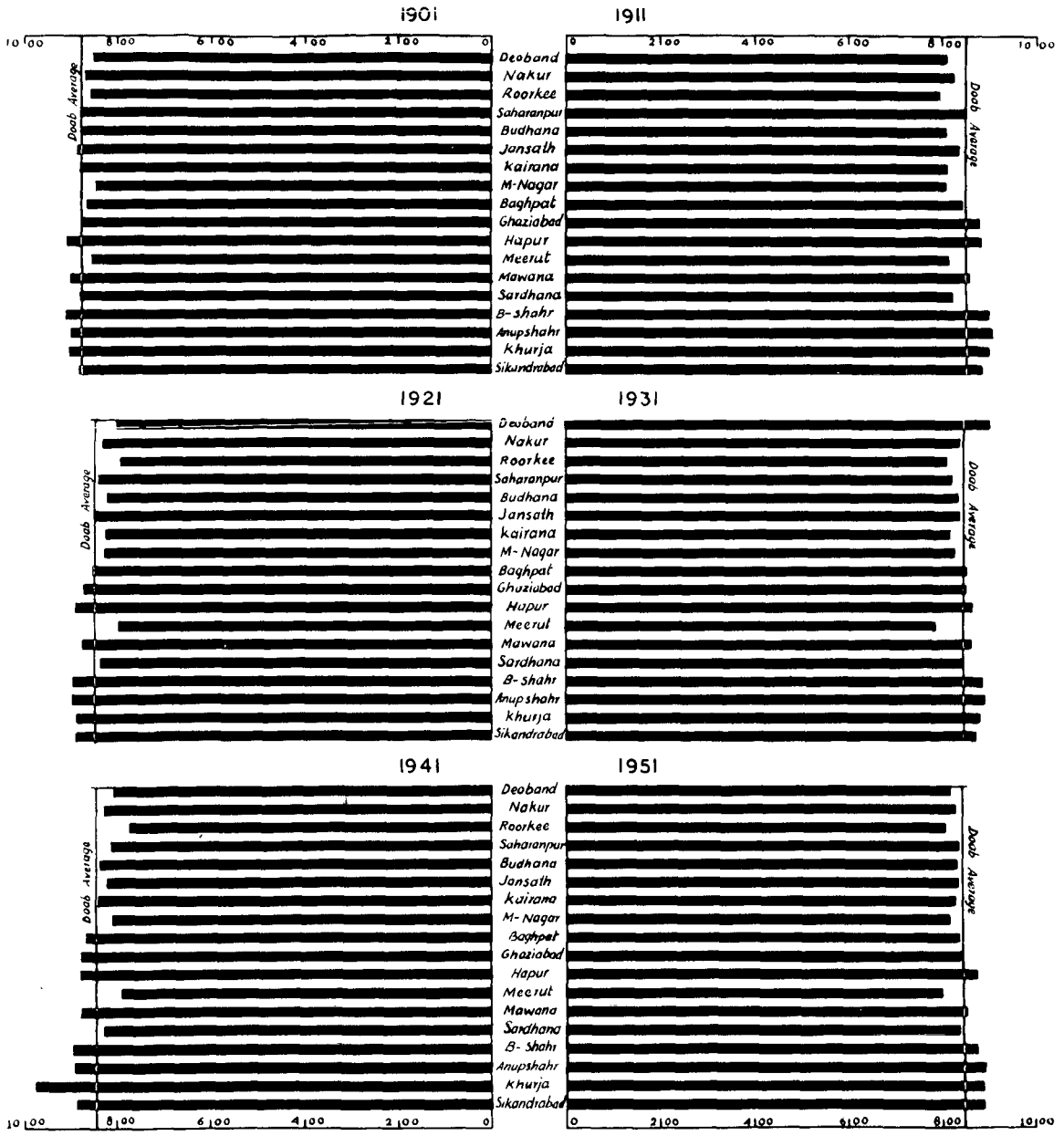
Tahsil/District	1901	1911	1921	1931	1941	1951
1	2	3	4	5	6	7
Deoband	849.7	809.7	803.1	810.7	803.8	818.6
Nakur	866.3	824.6	830.6	838.8	925.6	926.3
Roorkee	858.9	798.1	794.2	811.7	770.8	806.5
Saharanpur	875.4	854.6	840.1	821.3	812.0	835.2
DISTRICT	863.6	822.9	817.1	819.2	800.0	821.4
Budhana	869.3	811.3	820.7	833.2	837.3	831.3
Jansath	887.2	837.7	847.3	837.8	819.5	832.5
Kairana	879.0	812.5	823.1	819.2	839.8	825.5
Muzaffarnagar	844.6	807.7	825.2	825.3	808.4	815.1
DISTRICT	869.3	817.1	828.8	828.4	825.2	825.2
Baghpat	863.8	842.0	849.4	849.8	866.0	836.5
Ghaziabad	873.4	869.8	872.5	851.2	876.5	840.4
Hapur	907.3	821.7	887.4	862.9	878.9	873.0
Meerut	855.6	816.1	798.2	783.9	788.2	801.1
Mawana	900.0	859.1	877.1	860.9	874.4	851.9
Sardhana	979.6	822.2	835.2	839.7	821.7	838.2
DISTRICT	876.9	847.6	850.6	838.6	848.3	837.4
Bulandshahr	909.1	900.0	898.8	883.6	895.4	873.7
Anupshahr	901.9	905.5	909.3	893.3	889.5	891.4
Khurja	903.0	899.1	886.0	879.0	875.4	888.3
Sikandarabad	882.0	883.8	888.1	871.2	885.0	887.5
DISTRICT	899.6	897.4	895.7	882.3	909.4	881.1
Upper Doab	878.0	848.7	850.1	842.6	847.3	841.7
U.P.	937.0	915.0	909.0	904.0	907.0	910.0

S O U R C E : Calculations based on data from Census of India, U.P. Provincial Tables, 1901,1911,1921,1931,1941 and 1951.

FEMALES PER 1,000 MALES

BY TAHSILS

For Six Decades 1901-1951



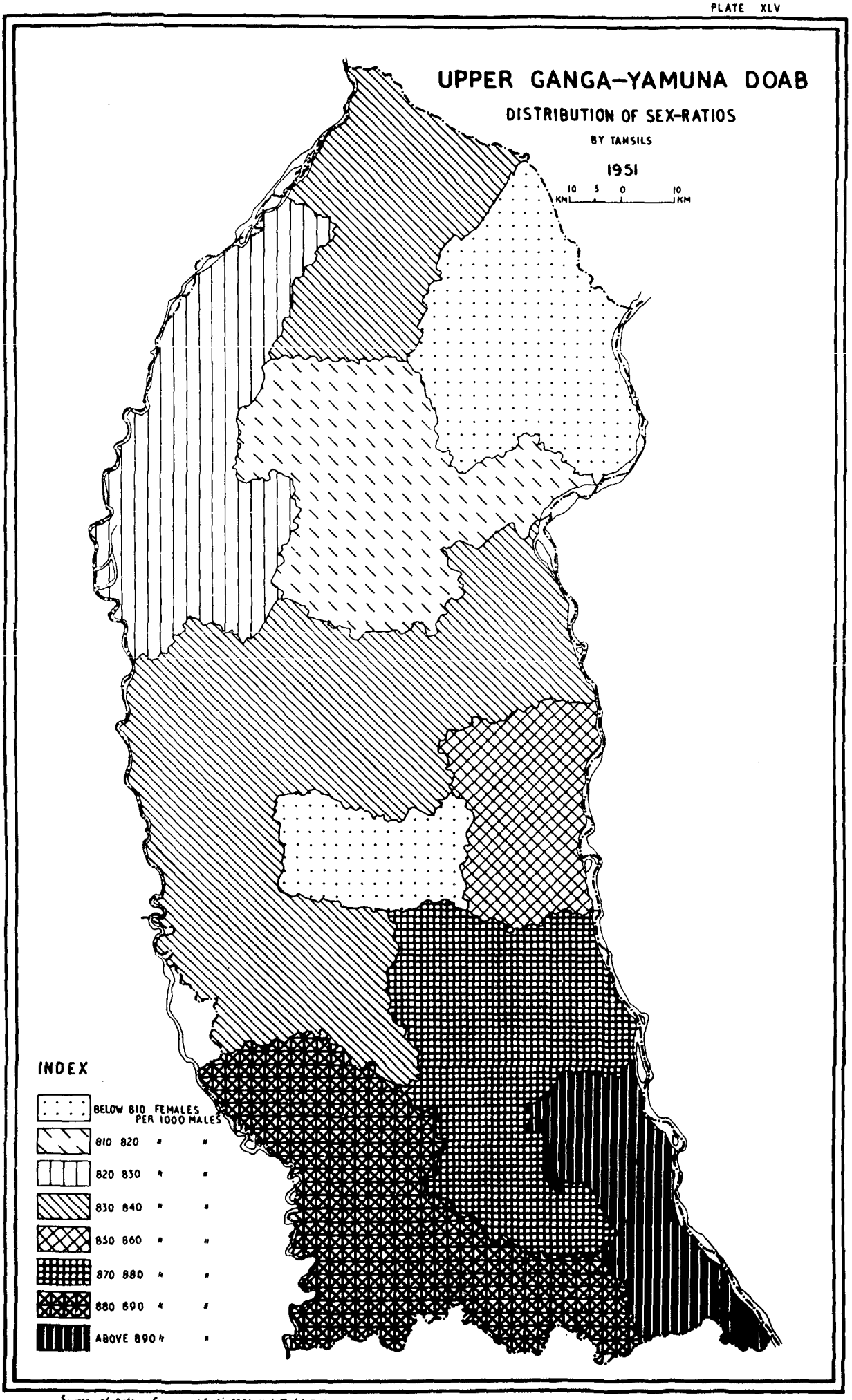
Based on Table LXXXVIII

FIG. 57

the biggest town of the district. In Saharanpur district - the northern most in the region - this west to east pattern has almost entirely been non existent throughout the half-century period under review. In fact the trend has been just the reverse. Roorkee the eastern most tahsil of the district did not only have the lowest sex-ratio in the district but also recorded the lowest ever in the whole of the Upper Doab namely 770.8 females per 1,000 males in 1941. In fact the tahsil has constantly been running most acutely from female deficiency throughout the half-century period. On the contrary the western tahsils of Nakur and Saharanpur have had the highest sex-ratios in the district during all these decades and even the fact that Saharanpur tahsil contained the second largest city of Upper Doab could not have the same effect on the sex-ratio as it most probably had in the other three districts of the region. The tahsil-wise pattern of sex-ratio is shown in Fig.58. The general west to east and north to south trend is clearly discernable.

Any hard and fast explanation of the above noted general trend and the reversal of the trend in Saharanpur is, for obvious reasons, rather impossible. However, it may be quite worth its while to see whether there existed any discernable causal connection between the pattern of sex-ratio variation and the sequence of variation of other aspects of population discussed earlier. Notable among the variation trends discussed in the earlier chapters were those that related to the growth of rural and urban population, the size categories of rural and urban centres and the occupational structure of the population of towns. All these aspects have been noted to have some possible connection of varying degrees with the general features of the agricultural situation.

PLATE XLV



Source of Data : Census of India 1951 vol. II pt. I-B

FIG. 58

No repetition of the details already given need be made here however, it may be recalled that the higher growth of urban population and greater incidence of big size villages and towns in the western sections had a centripetal effect and tempted the male population to migrate to such centres to get better and more profitable jobs. This postulated mechanism was unmistakeably noticeable in the cities and big towns at its best. Meerut city for instance not only had the lowest sex-ratio in the Upper Doab region but its female proportion of 752 per 1,000 males was among the three lowest proportions recorded in the thirty cities of the State of Uttar Pradesh in 1951. Kanpur the ~~highest~~ biggest industrial city of the State had the lowest proportion of 699 in that year.[3] It may, therefore, be inferred that with the increase in urbanity and compactness in the units of settlement the sex-ratio tended to be in defect on female side in Upper Doab as well as in the State and the whole of North India. This, however, may not be extended to apply to Western European countries of uncomparably high urbanization. The case of these countries is altogether different. These countries have, for the last one and a half century, been great centres of diffusion and exodus on an international scale. The colonization of the distant Americas and other far off parts of the world by the millions of European emigrants was too stupendous and hazardous a task to be a practical proposition for female folk. Thus the migration of males tended to increase the female ratio despite rapid urbanization. The two world wars also took huge toll of males and augmented the proportion of females in the sex-ratio in many European countries

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3. Census of India 1951 U.P., Vol.II Part I-B, subsidiary tables, Table 6.6-C, p.168.

When such is the nature of effect of urbanization the correlation of sex-ratio variation with the differential variation and growth of urban and rural population may easily be appreciated. From the rates of growth of rural and urban population discussed in chapter VI it will be observed that urban growth-rates were higher than the rural growth-rates in the western tahsils. Besides, the intra-urban variations according to size categories were relatively more in favour of the larger urban centres in the western and central tahsils than in the eastern ones. This state of affairs leads to a possible general formulation that, other things being equal, the masculanity of population in Upper Doab seems to have, in general, tended to increase with the increase in the urban population and the size of the urban centres. However, the matter is not as simple as a general formulation of this kind may make it to appear. There are so many other and complex socio-economic and cultural factors which may affect and actually do affect[4] the male-female ratios and are quite often so latent in their working that a complete analysis for a sizeable area is well nigh impossible.

3. VARIATION SINCE 1901

Table LXXXIX and Fig.59 show the decennial variation of male and female population by tahsils. A noticeable point about the trend of variation was a comparatively high decrease in female population during the first two decades of general decline. During the first decade the loss in female population was considerably higher than that in the male population in each of the

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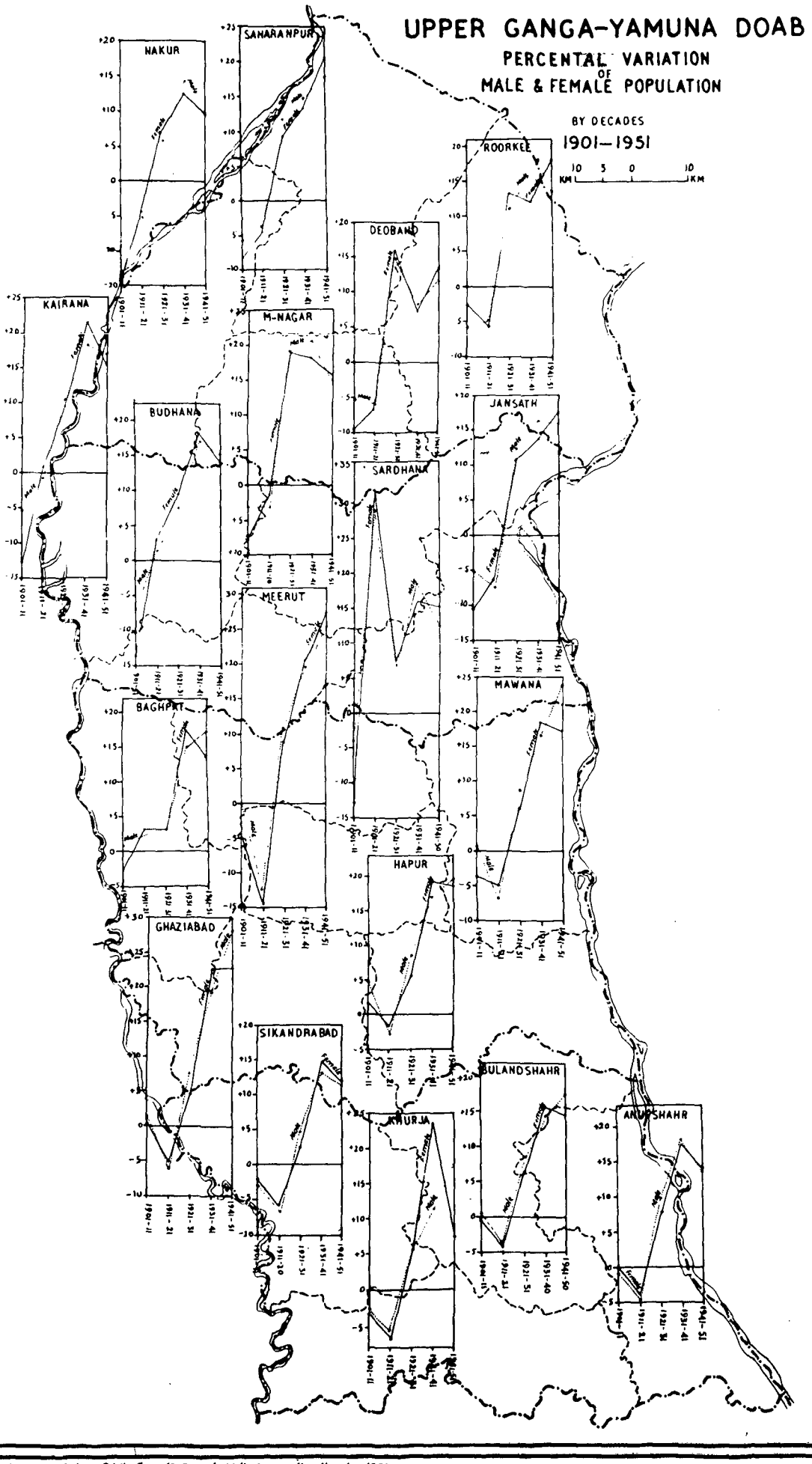
4. An interesting and informative detail of these factors may be found in Blunt's Report on Census of U.P. 1911, Vol.XV, Part I, Chapter VI, pp.181-198.



Source of Data : Distt. Gaz. 1903 and Distt. Census Handbooks 1951

FIG. 59

eighteen tahsils with the single exception of Sikandarabad. The amount of loss varied from district to district and from tahsil to tahsil as brought out in column 3 of table LXXXIX ranging from - 0.2 per cent in Bulandshahr and Amupshahr to - 14.0 per cent in Nakur. On the whole the female population of Upper Doab suffered a loss of nearly three times that suffered by the male population.

The main cause of this severe loss of female population was, by all probability, the greater vulnerability of the fair sex to the epidemics of plague and fever, both of which swept the Upper Doab districts, as also other parts of the State, during the opening decade of the present century. Though the tahsil-wise and even the district-wise statistics of mortality by cause of death were not differentiated by sex, such differentiation, however, was made for the State as a whole and from the examination of the vital statistics a striking correlation between the intensity of the epidemic and the widening of the danger zone in the life of woman is at once revealed. The general trend in the State was that for every four male victims of plague there were at least five female victims. The Upper Doab was not in any way an exception to this. Similarly the malaria epidemic was also on the average relatively more selective of women in its toll. Is there any possible medical explanation on this correlation is a query beyond the scope of the work but, nevertheless, the recorded statistics indicate, quite beyond doubt, that the correlation did actually exist.[5]

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5. The correlation cannot be better explained than quoting a brief excerpt from Blunt's report on the public health situation in U.P. during the 1901-1911 decade. He reports that " normally, this [danger] zone may be taken as extending from 1 to 5 and 15 to 30. In 1901 there was little plague and the figures were not affected. In 1902, the epidemic was four times as had as in 1901 (40,000 as against 10,000 deaths). The

contd.

TEHSIL-WISE PERCENTAL VARIATION OF MALE AND FEMALE POPULATION BY DECADES, 1901-1951

Tahsil	1901-1911 M	1901-1911 F	1911-1921 M	1911-1921 F	1921-1931 M	1921-1931 F	1931-41 M	1931-41 F	1941-1951 M	1941-1951 F
1	2	3	4	5	6	7	8	9	10	11
Deoband	-5.1	- 9.6	- 5.9	- 6.7	+15.0	+16.1	+7.9	+ 6.9	+11.4	+13.4
Nakur	-9.6	-14.0	- 4.8	- 4.1	+ 6.1	+ 7.2	+14.3	+12.5	+ 9.5	+ 9.6
Roorkee	+4.2	- 2.5	- 4.9	- 5.4	+10.8	+13.2	+18.0	+12.0	+12.9	+18.1
Saharanpur	-5.9	- 8.2	- 4.4	- 4.4	+12.0	+ 9.5	+14.8	+13.5	+17.1	+20.5
DISTRICT	-3.5	- 8.7	- 4.6	- 5.3	+11.2	+11.5	+14.2	+11.5	+13.4	+16.4
Budhana	-7.3	-13.4	+ 1.7	+ 2.9	+ 7.7	+ 9.4	+17.5	+18.1	+15.0	+14.1
Jansath	-5.1	-10.4	- 7.2	- 6.1	+12.3	+11.1	+16.4	+13.8	+15.9	+17.7
Kairana	-5.6	-12.7	+ 0.4	- 0.9	+10.3	+ 9.8	+18.3	+21.3	+17.0	+15.0
Muzaffarnagar.	-3.1	- 7.3	- 3.2	- 1.1	+19.1	+19.1	+20.4	+18.0	+14.6	+15.6
DISTRICT	-5.2	-10.8	- 2.4	- 0.9	+12.6	+12.6	+18.3	+17.8	+15.6	+15.6
Baghpat	+0.8	- 2.4	+ 2.2	+ 3.1	+ 3.2	+ 3.2	+15.0	+17.1	+17.2	+13.2
Ghaziabad	+1.0	+ 0.5	- 5.7	- 5.4	+ 7.4	+ 4.8	+19.3	+22.8	+28.2	+22.9
Hapur	+4.7	+ 1.8	- 2.6	- 1.9	+ 8.8	+ 5.8	+17.0	+19.1	+19.4	+18.6
Meerut	-0.1	- 4.7	-12.4	-14.3	+10.9	+ 9.0	+19.9	+20.5	+25.5	+27.5
Mawana	+0.7	- 3.8	- 7.0	- 5.0	+ 8.3	+ 6.3	+16.5	+18.4	+23.3	+17.2
Sardhana	-6.8	-13.0	+29.5	+31.7	+ 7.0	+ 7.5	+18.5	+16.0	+12.8	+15.1
DISTRICT	+0.2	- 3.1	- 1.5	- 1.1	+ 7.5	+ 6.0	+17.7	+19.1	+21.0	+19.4
Bulandshahr	+0.7	- 0.2	- 4.0	- 4.2	+ 7.9	+ 6.2	+14.1	+15.6	+17.3	+14.5
Anupshahr	-0.6	- 0.2	- 4.4	- 4.0	+ 9.6	+ 7.7	+18.0	+17.5	+13.8	+14.0
Khurja	-2.8	- 3.2	- 5.5	- 6.9	+ 6.8	+ 6.0	+11.3	+23.5	+17.7	+ 7.2
Sikandarabad	-2.4	- 2.2	- 6.4	- 6.0	+ 4.6	+ 2.6	+13.0	+14.8	+11.2	+11.5
DISTRICT	-1.1	- 1.3	- 5.0	- 5.2	+ 7.3	+ 5.7	+14.2	+17.7	+15.6	+12.0
Upper Doab	-2.0	- 5.3	- 3.2	- 3.1	+ 9.3	+ 8.3	+16.2	+16.8	+17.0	+16.2

S O U R C E : Calculations based on data from Census of India, U.P. Provincial Tables 1901, 1911, 1921, 1931, 1941 & 1951.

5. contd.

the difference between the ratios of female and male deaths in favour o the former decrease considerably at the age-periods 5 to 10 and 30 to 4 and the female rate exceeded the male at the age-periods 10 to 15. In

During the second decade which was relatively free from the epidemics the female population made a phenomenal recovery by reducing the loss to 3.1 per cent as against the male loss of 3.2 per cent. This actually means that while female population made a gain in the sense that it attenuated the previous loss by about 40 per cent the male population on the contrary accentuated its loss by almost 60 per cent. Thus the disturbed state of sex-ratio of the first decade was redeemed and the normal state was to some extent re-established during the second decade. During the three subsequent decades the increase in the male population had, alternately, a slight edge over the increase in the female population - the latter surpassing the former only at the end of the fourth decade. The sex-ratio, therefore, remained considerably in defect of females upto 1951 despite a partial recovery by female population during the second and fourth decades. On the other hand the sustained increase in male population during the later decades of the half century gave Upper Doab the distinction of highest masculinity of population among the various States of the country including the home State of U.P. Upper Doab's masculinity index of 1,188 in 1951 was about 24 per mile higher than that of its nearest rival namely West Bengal which had the second highest index of 1,164 in that year.

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5. contd.
1903 plague was twice as fatal as in 1902. The female death-rate now exceeded the male also at the period 30 to 40 with so few deaths as 84,000 therefore women were already suffering proportionately more than men from the ages of 10 to 40. In 1904 plague was over twice as fatal as in 1903, and the age period 5 to 10 also entered the danger zone; and in 1905 (when plague was at its zenith) that zone extended from 1 to 50. It is unnecessary to pursue the figures in detail any further: but it may be stated generally that as plague increases women suffer more than men first at the period 10 to 15, then also at 30 to 40, next also at 5 to 10 and lastly at 40 to 50, and that as it decreases there is a tendency to re-establishment of the normal in retrograde order".
(Blunt. W.A.H., Census of India 1911, Vol. V. United Provinces of Agra and Oudh, Part I, Report, p.43.

4. SEX-RATIO IN RURAL AND URBAN POPULATION

The sex-wise break up of rural and urban population of tahsils has not been published by the census of India. The variation in sex-ratio in rural and urban population can, therefore, be traced only at district level. The sex-ratio of the urban population (both the city and the non-city) has been considerably lower than that of the rural population in all the districts of Upper Doab. In this respect the region compared fairly well with the State of U.P. Table XC gives the trend of comparative variation of sex-ratio in the urban and rural population of the districts of Upper Doab and the State of U.P. during the first fifty years of the present century.

TABLE XC

SEX-RATIO VARIATIONS IN RURAL AND URBAN POPULATION OF THE DISTRICTS OF UPPER DOAB AND THE STATE OF U.P. 1901 to 1951

District/State	Females per thousand males											
	1901		1911		1921		1931		1941		1951	
	R	U	R	U	R	U	R	U	R	U	R	U
1	2	3	4	5	6	7	8	9	10	11	12	13
Saharanpur	861	867	831	788	836	740	833	760	844	715	832	791
Muzaffarnagar	867	883	819	803	830	822	838	780	833	783	831	798
Meerut	884	845	859	791	867	774	857	758	866	772	853	783
Bulandshahr	897	911	900	886	922	857	891	838	922	845	884	864
Upper Doab	879	872	855	813	862	790	856	778	865	773	852	802
U.P.	940	916	922	853	919	826	917	807	923	805	925	820

S O U R C E: Census of India, U.P. Provincial Tables 1901, 1911, 1921, 1931, 1941, 1951.

It will be seen from the table that it was only in the year 1901 that the distribution of sex-ratio was rather uniform between the rural and the urban sections of population. In fact the urban sex-ratio was fairly high in the three districts of Saharanpur, Muzaffarnagar and Bulandshahr and was

lower only in Meerut district. The urban sex-ratios clearly varied in an inverse proportion with the degree of urbanity in the districts. The least urbanized district of Bulandshahr had the highest urban sex-ratio of 911 and the most urbanized district of Meerut had the lowest viz 845. Saharanpur the second most urbanized district - had the second lowest urban sex-ratio of 867 and was followed by Muzaffarnagar with the corresponding ratio of 883.

It has been noted in the chapter VI that noticeable urbanization started only after the first decade of the century and as such the effects of the pull of the urban centres began to be increasingly felt in the sex composition of the population during the subsequent decades. From 1911 onwards the female deficiency continued to be higher in the urban population compared with the deficiency in the rural population. Though the urban-rural gap of sex-ratio has followed an irregular course of ups and downs during these forty years in the various districts it, on the whole, has however been steadily widening upto 1941 - the year of Great Divide in the growth of towns by size (table LXXII) - in which year it attained the maximum of 92 per thousand in Upper Doab as a whole. This trend has been in perfect conformity with the general trend in Uttar Pradesh. In U.P. this gap varied as 69 per mille in 1911, 93 per mille in 1921, 110 per mille in 1931 and 118 per mille in 1941 while in Upper Doab the gap varied as 42 per mille in 1911, 72 per mille in 1921, 78 per mille in 1931 and 92 per mille in 1941. This indicates a complete correspondence in the trend of gap variation in Upper Doab and the State but, nevertheless, the gap has always been comparatively narrow in Upper Doab region.

This sex-ratio gap in the two segments of population was in some measure a reflex of rural-urban migration. It has been noted in detail in the previous chapter that the abnormal increase in urban population has,

to a large extent, been due to immigration into cities and towns from the villages. By nature the females are less prone to migration than the males. Besides, the cities and towns are, for economic reasons, highly selective of male sex for meeting the growing labour requirements of the expanding and growing industries. Thus in this process of selected migration female ratio tended to become noticeably lower in the urban population especially the urban city population whereas it tended to have a slight rise in the rural population. This seems to be the only plausible explanation of higher female deficiency in the urban population.

CHAPTER VIII

AGE STRUCTURE

1. G E N E R A L

Single year age returns and continous quinquennial age-groups for districts have not been published for the earlier censuses of the State. The district figures for the first two censuses of the century are available only under three slabs, namely (1) five-year slab for ages from 0 to 20 (2) twenty-year slab for ages from 20 to 60 and (3) a composite slab for 60 and over whereas for the subsequent two censuses of 1921 and 1931 the second slab of the preceding censuses has been broken up into decennial age-groups while the first and third slabs have been retained in tact. The publication of provincial tables of 1941 census was much curtailed due to the second world war[1] and did not contain district-wise age data while the District Census Statistics of that year were confined to village statistics on district level and also did not contain data for age structure. The single year age and continuous quinquennial age-group figures for districts are, however, available for 1951 and they are based on about 10 per cent sample of the total enumerated population.[2]

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1. " The census enumeration was carried out in full according to plan but the Government of India decided to restrict the tabulation for British Indi Consequently the tables in this volume cover less than half the contemplate range and offer in effect only the distribution ofthe population by communi and by province or state, district, tahsil and town" (Sahay, B.Census of India 1941, Vol.V, U.P. Frontispiece Note)
2. Census of India, 1951, U.P. District Census Handbooks, Table C-V.

Besides, district-wise age figures for the groups 0., 1-4, 5-14, 15-34, 35-54 and 55 and over are also available for every 10,000 of the total population.[3] It may, therefore, be easily seen that any detailed comparison of age structures at various censuses has been greatly vitiated by different systems of age enumerations. The difficulty in making comparisons is further confounded by the fact that the definition of age for purposes of census enumerations has been changing. Upto 1921 ~~1923~~ it was instructed to " enter the number of years each person has completed and for infants less than one year old to enter the word ' bachcha' (infant)." This system of 'age last birthday' was changed to that of 'the age nearest birthday' in 1931. The enumerators were instructed to " enter the number of years to the nearest birthday or the nearest age (in years) known. For infants less than six months old to enter 0; for infants six months old but less than eighteen months to enter 1. In every case the age must be shown in whole years. Months are never to be entered".[4] This system was again changed in 1941. The enumerators recorded the age in years and months but the tabulator smoothed these entries on the basis of ' the age last birthday'. Infants under one year of age were tabulated as of 0 age. The 1951 census followed the definition of age recommended by the United Nations Population Commission.[5] The Commission in its report on Population Census Methods recommended that the actual number of completed years should be entered and 0 year should be written for infants below one year of age.[6]

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3. Census of India 1951, U.P. Part I-B, Subsidiary Tables, Tables 6.9; 6.10; 6.11; 6.12; 6.13 and 6.14
4. Turner, A.C. Census of India 1931, United Provinces of Agra and Oudh, Vol. XVIII, Part I-Report, p. 209.
5. Rajeshwari Parasad; Census of India 1951, Uttar Pradesh, Vol.II,Part I-A, Report, p.344.
6. United Nations Population Commission; Population Census Methods,p.15.

Moreover the groupings used in various censuses have also varied considerably. In 1901 and 1911 censuses the ages were entered under groups comprising four sets of quinquennial age-groups of 0-5, 5-10, 10-15 and 15-20; two sets of bidecennial age-groups of 20-40 and 40-60 and one consolidated age-group of 60 and over.[7] In 1921 the second set of age-groups was expanded and entered on decennial basis thus making it to comprise four sets of age-groups (20-30, 30-40, 40-50, and 50-60) instead of two sets of the earlier censuses. The first and the last sets were kept intact save that the first group was subdivided into two groups of 0-1 and 1-5. The 1921 system was adopted in the 1931 census with only one change. The change was that single year age figures were entered for the first five year age-group.[8] In 1941 due to war conditions district figures for various age-groups were not published, however, in the Subsidiary Tables for 1951 the district-wise age figures for 1941 have been published under the following groups: 0, 1-4, 5-14, 15-34, 35-54 and 55 and over[9] for a sample of 10,000 persons. Then in 1951 census though the single year age figures for every district and tahsil have been published for a sample of roughly ten per cent of the total population but it has been explicity pointed out by the superintendent of the census operations that " it is not safe to rely on the single year age returns"[10]. For the purpose of eliminating possible unintentional errors in the age figures the groupings which have been used in the census of 1951 are decennial for the entire range of ages

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7. Census of India, 1901, Vol.XVI-A, N.W. Provinces and Oudh Pt.II, Table VI pp. 50-51 and Census of India 1911, Vol.XV-A, U.P. of Agra and Oudh Pt.II, Table VII, pp. 68-69.
8. Census of India, 1921, Vol. XVI, U.P. of Agra and Oudh, Pt.II, Table VII, pp. 70-71 and Census of India 1931 Vol. XVIII, U.P. of Agra and Oudh Pt. II, Table VII, pp. 122-125
9. Census of India 1951, Vol.II, U.P. Pt. I-B-Subsidiary Tables, Tables 6-9 to 6.14 pp.177-182.
10. Rajeshwari Parasad, Census of India 1951, U.P. Vol. II Pt.I-A-Report p.345.

from 5 to 74 namely 5-14, 15-24, 25-34, 35-44, 45-54, 55-64, 65-74 and 75 and over whereas the ages under 5 have been set out in two sets of 0 and 1-4.

These variations in the age-groupings make the task of comparison between various censuses all the more difficult. Under the limitations imposed by the nature of statistics available the only possible way out for comparative analysis and assessment of the trend of variation in the age structure of the district population is to use the age-group system adopted for the 1901 census. In adopting this line of comparison an apparent difficulty might be felt with the 1951 data as they have been set out in decennial groups ending in digits which are not multiples of five. This, however, is not a serious difficulty as the quinquennial periods ending in 5 and multiples of five (used in the earlier enumerations)were not inclusive of both the first and the last digits. In fact such periods were counted from the first digit whereas the last digit was not included in that period. Thus, for instance, the group 5-10 included five age years beginning with five and ending in 9. The overlaping gradation of earlier censuses has for good reason been changed into a continuous one in 1951 so that now 5-9 stands for the group of 5-10 of the earlier census and so on. Even in this restricted comparison there is an unavoidable break in 1941 as for this census the district figures for the seven age-groups of the 1901 system are not available.

2. VARIATIONS IN AGE STRUCTURE

Sex-wise percentages of various age-groups in Upper Doab for the five census years are set out in table XCI. It will be seen from the table that the age structure has not changed materially during the fifty years. The

population has been very progressive throughout. The percentage of population under fifteen years has constantly been high ranging from a minimum of 37.3 (in 1911) to a maximum of 39.3 (in 1931). The percentage of youngmen and women in the age groups of 15 to 39 has also not recorded any notable change. The percentage has fluctuated between

TABLE XCI

PERCENTAL AGE DISTRIBUTION OF EACH SEX IN THE UPPER DOAB, 1901 - 1951

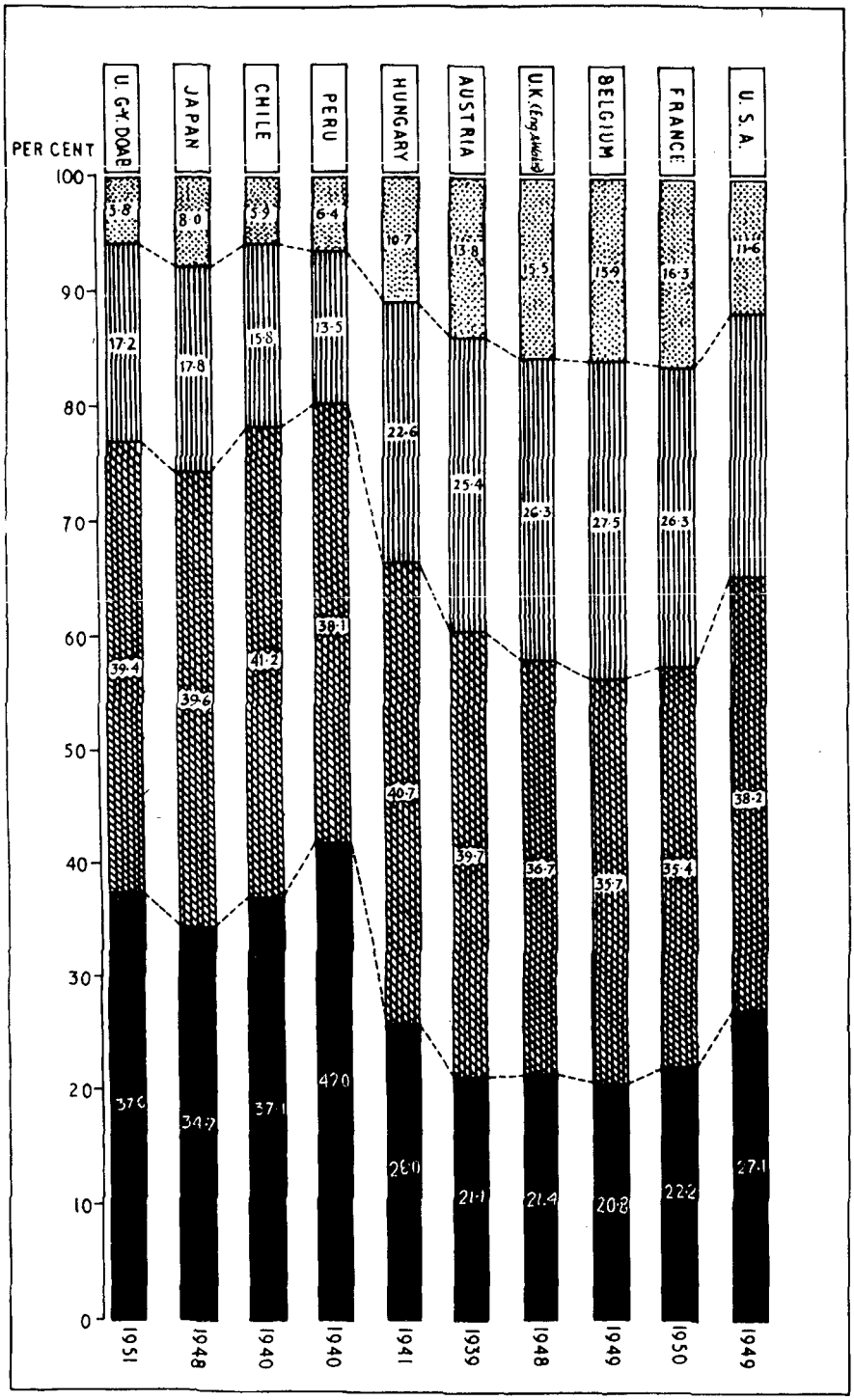
Age groups	1901		1911		1921		1931		1951	
	M	F	M	F	M	F	M	F	M	F
1	2	3	4	5	6	7	8	9	10	11
0- 4	7.4	6.8	6.0	5.7	6.4	6.2	7.8	7.7	7.6	6.7
5- 9	7.0	6.0	7.0	6.0	7.3	6.4	6.7	5.6	6.1	5.4
10-14	6.2	4.7	7.2	5.4	6.6	4.9	6.4	5.1	6.6	5.2
0-14	20.6	17.5	20.2	17.1	20.3	17.5	20.9	18.4	20.3	17.3
15-19	4.6	3.8	5.4	4.4	5.2	4.2	5.0	4.3	5.1	4.3
20-39	16.3	14.8	16.5	14.1	16.5	14.2	17.3	15.4	16.7	13.3
40-59	9.2	8.0	9.4	7.9	9.0	7.7	8.2	6.5	9.8	7.4
15-59	30.1	26.6	31.3	26.4	30.7	26.1	30.5	26.2	31.6	25.0
60 and over	2.6	2.6	2.7	2.3	3.0	2.4	2.3	1.7	3.3	2.5

S O U R C E : Calculations based on data from Census of India U.P. Provincial Tables for various years.

39.4 (in 1951) and 42.0 (in 1931). In both these groups the variation has never exceeded two and three per cent respectively. The enormously high percentage of the lower and young age-groups which has never dropped below 76 per cent during the first fifty years of this century indicates high progressive potency of the population which consequently has a longway to go before it could reach the stage of maturity in the dynamics of numbers. The percentage of elderly persons has likewise changed but very little and has been fluctuating between 4.0 per cent (1931) and 5.8 per cent (1951).

The immature and progressive character of Upper Doab's population is at once impressed by comparison with the age structure of population of the countries which are well known for a stable and slow multiplying population and the countries which have a rapid growing populations. Table XCII gives age-group figures for certain selected countries of the world. Beligium, U.K., and France which are known to have attained considerable stability in the dynamism of their population numbers had some of the lowest percentages in the lower-age group in the world. From the table and Fig.60 it will be seen that the percentage of under-fifties in these countries was almost two-thirds of what it was in the Upper Doab region. Also the combined percentage of the lower and young age-group was notably low in these countries (being 56.5 per cent in Belgium, 57.6 per cent in France, and 58.1 per cent in U.K.) compared with the corresponding percentage of 77 in Upper Doab, whereas the percentages of higher age-groups, in these countries were almost three times of the corresponding percentage in Upper Doab. This contrast in the age structure of Upper Doab and European countries is strikingly

PERCENTAGE OF POPULATION IN MAJOR AGE-GROUPS
IN
SELECTED COUNTRIES OF THE WORLD



BASED ON TABLE XC II

FIG. 60

conveyed by the population pyramids shown in Figs. 61 and 62.

It may be inferred from these pyramids and the vital statistics discussed in the earlier chapter that low longevity and high death-rates in Upper Doab resulted in the reduction of the number of aged persons while high birth-rates caused a large concentration of population in the younger ages. The pyramid for Upper Doab had, therefore, a broad base and a rapidly attenuating top. The pyramids for the age structure of the population of Chile and Peru and to some extent of Japan too had almost a similar form (Figs. 63 and 61). A notable point is that these countries belonged to the category of developing countries.

TABLE XCII

PERCENTAL DISTRIBUTION OF SELECTED AGE-GROUPS IN UPPER DOAB AND CERTAIN COUNTRIES OF THE WORLD

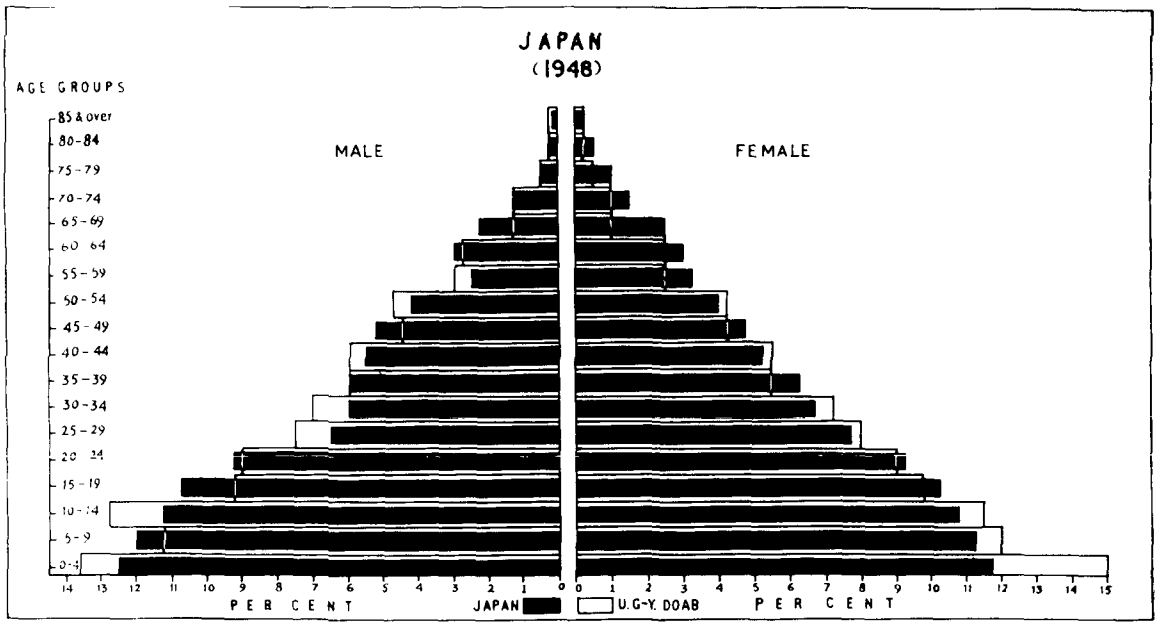
Country	Age - group			
	0-14	15-39	40-59	60and over
1	2	3	4	5
FRANCE (1951)	22.2	35.4	36.3	16.3
BELGIUM(1949)	20.8	35.7	27.5	15.9
U.K. Eng.(1948)	21.4	36.7	26.3	15.5
AUSTRIA (1939)	21.1	39.7	25.4	13.8
U.S.A (1949)	27.1	38.2	23.1	11.6
HUNGARY (1941)	26.0	40.7	22.6	10.7
JAPAN (1948)	34.7	39.6	17.8	8.0
CHILE (1940)	37.1	41.2	15.8	5.9
PERU (1940)	42.0	38.1	13.5	6.4
UPPER DOAB(1951)	37.6	39.4	17.2	5.8

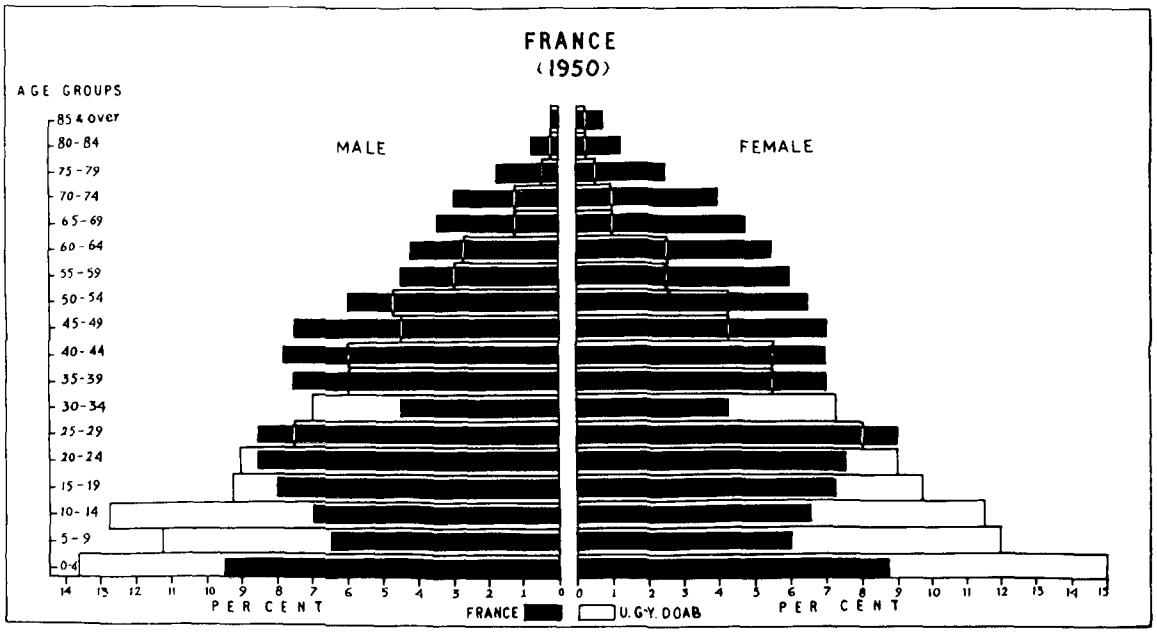
S O U R C E : Calculations based on data from:
a) United Nation's Demographic Year book 1949-50, Table 4, pp.104-167.
b) District Census Handbooks 1951 for the Districts of Saharanpur, Muzaffarnagar, Meerut, and Bulandshahr.

SEX AND AGE STRUCTURE

FOR

UPPER GANGA–YAMUNA DOAB & SELECTED COUNTRIES OF THE WORLD





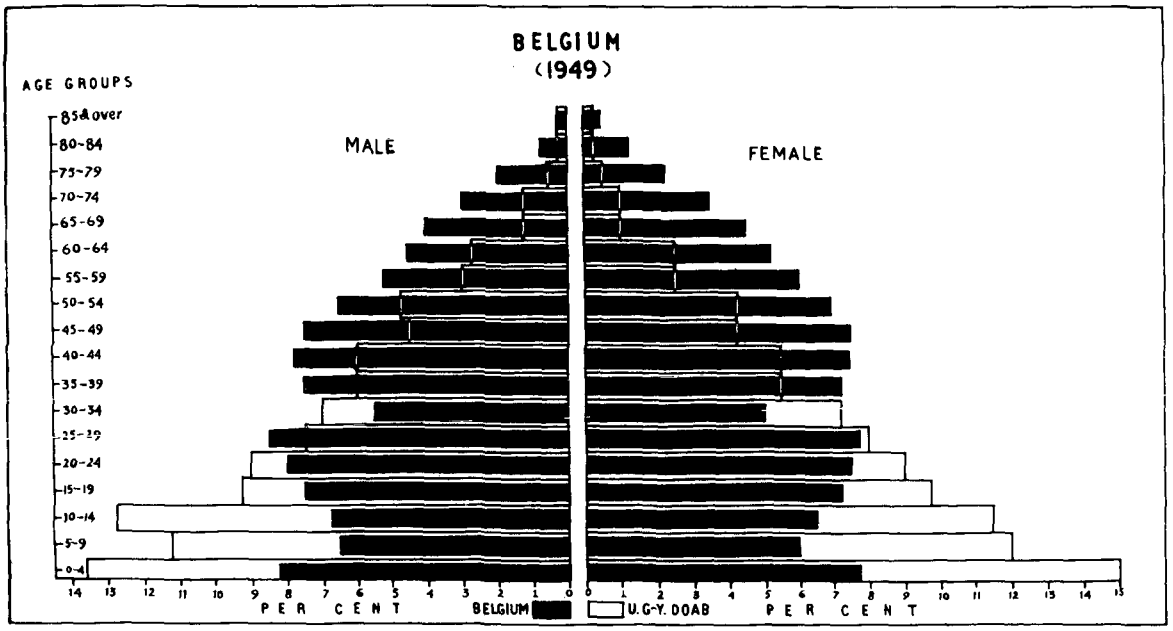
BASED ON TABLE XC/11

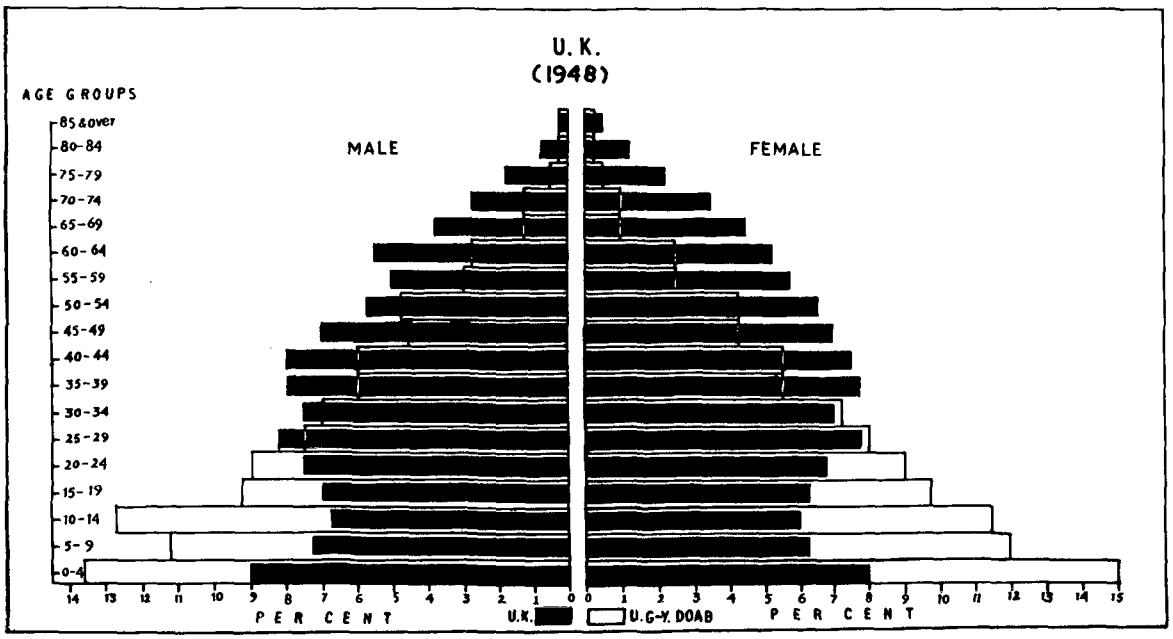
FIG. 61

SEX AND AGE STRUCTURE

FOR

UPPER GANGA – YAMUNA DOAB & SELECTED COUNTRIES OF THE WORLD





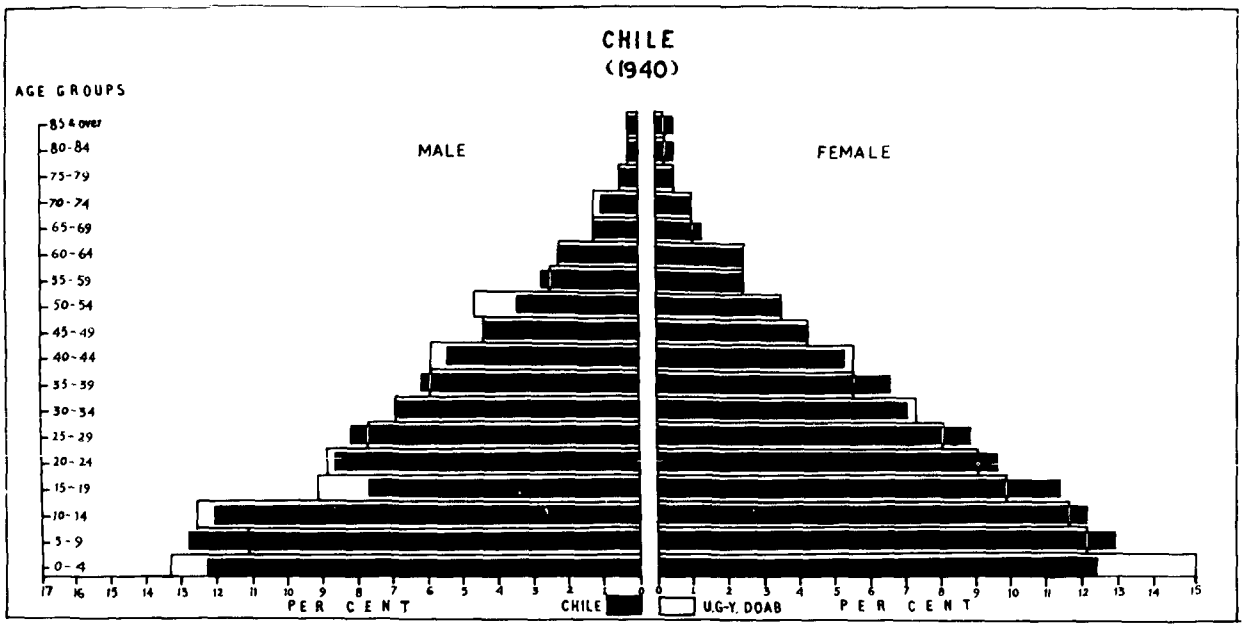
BASED ON TABLE XCIII

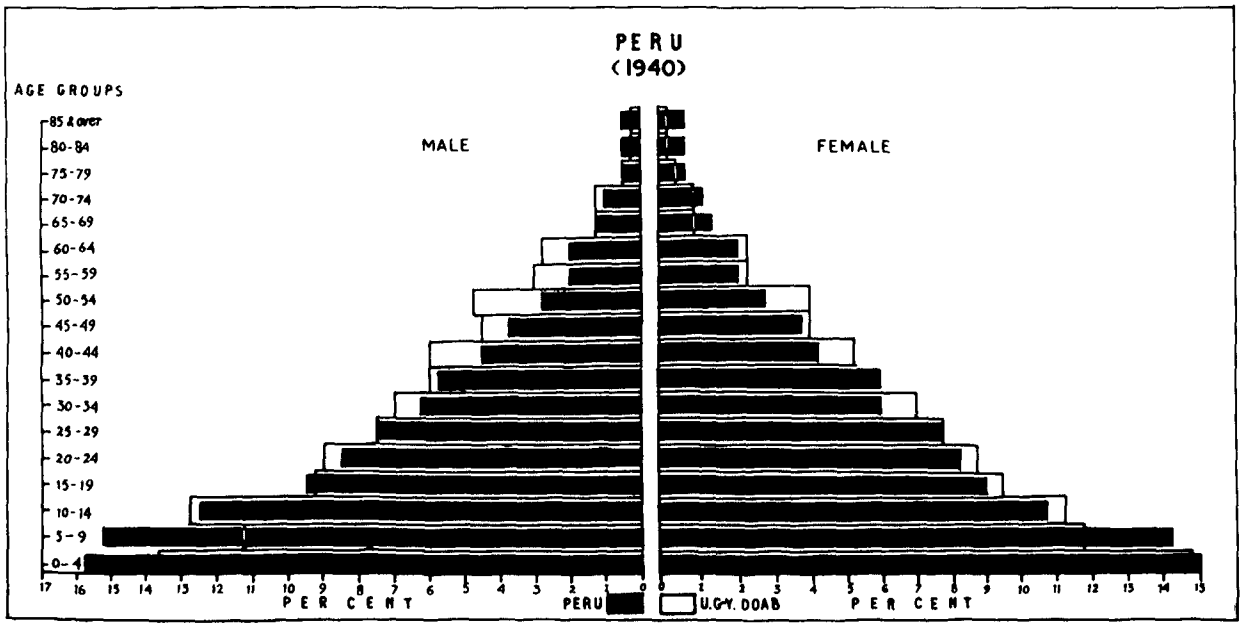
FIG. 62

SEX AND AGE STRUCTURE

FOR

UPPER GANGA – YAMUNA DOAB & SELECTED COUNTRIES OF THE WORLD





BASED ON TABLE XC I.11

FIG. 63

The first two represented the conditions in Latin America - a continent where population seemed to be in a really explosive mood-whereas Japan (together with U.P. and Upper Doab) was representative of the state of population dynamism in Asia. It appears that in the developing countries the improved health services and hygienic conditions have considerably increased the survival expectancy whereas birth-control measures being a matter of an individual's choice and attitude not made sufficient headway to counter-balance the increased survival rate at the lower age slabs. On the contrary the pyramids for Belgium, France, and U.K. had a more composed form: neither their bases were as broad nor did they rapidly tend to taper at the top. This infact is an indication of high maturity of the population: Both the birth and death-rates were low so that neither the base was unduly broad nor the top very narrow. Due to low birth-rates the burden of dependenc and liability was not so high as to deny the amenities of good and healthy living to the elderly persons and thus the longevity was considerably raised and the top of the pyramids did not quickly or sharply attenuate. The detailed statistical comparisons may be had from table XCIII.

TABLE XCIII

PERCENTAL DISTRIBUTION OF POPULATION OF UPPER DOAB, U.P., AND SOME SELECTED COUNTRIES OF THE WORLD BY FIVE YEAR AGE-GROUP

Age-group	U. Doab 1951		U.P. 1951		CHILE 1940		PERU 1940		JAPAN 1948		BELGIUM 1949		FRANCE 1950	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	100	100	100	100	100	100	100	100	100	100	100	100	100	100
0- 4	13.6	14.9	13.4	13.6	12.6	12.2	15.8	15.2	12.6	11.7	8.2	7.7	9.6	8.
5- 9	11.3	12.0	13.0	12.6	12.9	12.4	15.3	14.5	11.9	11.2	6.4	6.0	6.6	6.
10-14	12.4	11.6	12.6	11.8	12.3	11.9	12.5	11.0	11.3	10.7	6.8	6.5	7.1	6.
15-19	9.3	9.7	9.0	8.6	10.3	10.1	9.6	9.3	10.8	10.3	7.5	7.2	8.1	7.
20-24	9.0	9.0	7.8	8.2	8.8	9.4	8.6	8.5	9.3	9.3	7.9	7.4	8.4	7.
25-29	7.4	8.0	8.0	7.8	8.2	8.8	7.4	8.1	6.4	7.8	8.4	7.8	8.5	7.
30-34	7.0	7.2	7.2	7.4	7.1	6.9	6.2	6.2	6.1	6.8	5.4	5.1	4.6	4.
35-39	6.1	5.6	6.2	6.0	6.3	6.5	5.8	6.2	6.0	6.3	7.6	7.3	7.5	7.
40-44	6.0	5.5	6.0	5.8	5.5	5.2	4.5	4.5	5.5	5.2	7.7	7.5	7.7	7.
45-49	4.6	4.2	4.6	4.4	4.4	4.2	3.8	3.9	5.2	4.8	7.6	7.5	7.6	7.
50-54	4.7	4.3	4.4	4.4	3.5	3.5	2.8	3.0	4.3	3.9	6.6	6.9	6.1	6.
55-59	2.9	2.4	2.6	2.4	2.7	2.6	2.1	2.3	3.5	3.3	5.3	5.9	4.6	5.
60-64	2.7	2.7	2.2	2.8	2.2	2.5	1.9	2.3	3.0	3.0	4.6	5.2	4.2	5.
65-69	1.3	1.1	1.2	1.3	1.3	1.3	1.2	1.5	2.3	2.5	4.0	4.5	3.5	4.
70-74	1.2	1.0	1.0	1.1	0.9	1.1	0.9	1.3	1.3	1.6	3.0	3.5	2.9	3.
75-79	0.4	0.4	0.4	0.6	0.5	0.6	0.6	0.8	0.6	0.9	1.9	2.3	1.8	2.
80-84	0.3	0.3	0.2	0.4	0.3	3.4	0.5	0.7	0.2	0.4	0.8	1.2	0.8	1.
85 and over	0.2	0.2	0.2	0.3	0.2	0.4	0.5	0.7	0.1	0.2	0.3	0.5	0.3	0.

SOURCE : Calculations based on data from:

a) District Census Handbooks 1951 for Saharanpur, Muzaffarnagar, Meerut, and Bulandshahr
b) Census of India 1951, Vol.II, U.P. Part I-BO Subsidiary Tables
c) United Nations Demographic Year-Book 1949-50, Table 4, pp. 104

The position in the individual districts of Upper Doab has been more or less the same: the age-group structure changing very little during the five decades (1901-1951). The relevant statistics for the five censuse are set out in tables XCIV, XCV, XCVI, and XCVII. A close examination of these tables reveals that in Upper Doab districts the general tendency has been of a steady (though of course not high) increase in the percentages of lower age-groups and decrease in the percentages of middle and higher age levels after 1921. For instance in Saharanpur the percentage of 0-14 age-group after suffering a slight depletion in 1911 and 1921 (being 37 per cent in each of the two years) increased to 39.4 per cent in 1951 compared with 37.9 per cent in 1901. The variation in Muzaffarnagar has been fluctuating and ultimately the proportion became one per cent higher in 1951 (being 39.3) than what it was in 1901. The pattern of variation in Bulandshahr was almost identical with that noted in Saharanpur. In this district, too, the percentage after a continued decline for two decades (1901-11 and 1911-21) registered an increase of 0.2 and 0.4 per cent respectively in 1931 and 1951 over 1901 proportion of 39.3 per cent. Meerut district, however, was an exception to this general trend. After remaining almost stationary during the first decade the percentage of 0-14 age-group had a steady increase during the second and third decades and attained its maximum of 39.3 in 1931 before declining to sub-1901 level by the time of 1951 census.

In contrast to the general increase in the lower age-group, the middle age-group percentages suffered from decline in each of the four districts

TABLE XCIV
PERCENTAL AGE DISTRIBUTION BY SEX IN SAHARANPUR DISTRICT, 1901-1951

Age-group	1901		1911		1921		1931		1951	
	M	F	M	F	M	F	M	F	M	F
1	2	3	4	5	6	7	8	9	10	11
0- 4	7.0	6.6	6.1	5.8	5.9	5.7	7.9	7.6	8.8	6.8
5- 9	6.3	5.6	6.6	5.8	7.2	6.3	6.8	5.6	6.4	5.3
10-14	6.6	5.8	7.4	5.4	7.0	5.0	6.5	5.1	7.0	5.1
Total (0-14)	19.9	18.0	20.1	17.0	20.1	17.0	21.2	18.3	22.2	17.2
15-19	4.8	3.8	5.5	4.2	5.3	4.2	5.3	4.5	5.1	3.8
20-39	17.0	14.8	17.5	14.5	17.4	14.3	18.0	14.4	17.3	13.2
Total (15-39)	21.8	18.6	23.0	18.7	22.7	18.5	23.3	18.9	22.4	17.0
40-59	9.0	7.7	9.2	7.3	9.4	7.4	8.2	6.2	11.0	8.2
60 and over	2.6	2.4	2.6	2.1	2.8	2.1	2.3	1.6	1.1	0.9

S O U R C E : Calculations based on data from Census of India, U.P. Provincial and Imperial Tables for various years.

TABLE XCV

PERCENTAL AGE DISTRIBUTION BY SEX IN MUZAFFARNAGAR DISTRICT, 1901 - 1951

Age-group	1901		1911		1921		1931		1951	
	M	F	M	F	M	F	M	F	M	F
1	2	3	4	5	6	7	8	9	10	11
0- 4	7.2	7.0	6.2	6.0	6.5	6.5	8.1	7.8	7.4	6.7
5- 9	7.3	5.8	7.2	6.2	7.5	6.6	6.8	5.8	6.8	6.0
10-14	6.2	4.8	5.2	7.4	7.0	5.1	6.5	5.2	6.9	5.5
Total (0-14)	20.7	17.6	18.6	19.6	21.0	18.2	21.4	18.8	21.1	18.2
15-19	4.8	4.1	5.6	4.3	5.5	4.2	5.2	4.4	5.7	4.4
20-39	16.4	14.6	16.5	14.0	16.3	13.6	17.5	14.2	15.4	13.2
Total (15-39)	21.2	18.7	22.1	18.3	21.8	17.8	22.7	18.6	21.1	17.6
40-59	9.0	7.7	9.4	7.3	8.9	7.1	8.2	6.4	12.0	8.3
60 and over	2.6	2.5	2.7	2.0	3.0	2.2	2.3	1.6	1.1	0.6

S O U R C E : Calculations based on data from Census of India, U.P. Provincial and Imperial Tables for various years.

TABLE XCVI

PERCENTAL AGE DISTRIBUTION BY SEX IN MEERUT DISTRICT, 1901 - 1951

Age-group	1901		1911		1921		1931		1951	
	M	F	M	F	M	F	M	F	M	F
1	2	3	4	5	6	7	8	9	10	10
0- 4	6.6	6.4	5.9	5.6	6.5	6.3	7.7	7.5	7.0	6.6
5- 9	7.1	5.9	7.0	6.0	7.2	6.4	6.7	5.7	5.6	5.0
10-14	6.4	4.5	7.0	5.3	6.5	4.8	6.5	5.2	6.2	5.1
Total (0-14)	20.1	16.8	19.9	16.9	20.2	17.5	20.9	18.4	18.8	16.7
15-19	4.9	4.0	5.4	4.4	5.2	4.2	5.2	4.4	5.2	4.4
20-39	16.0	15.0	16.2	14.0	16.5	13.9	17.4	14.3	17.0	12.8
Total (15-39)	20.9	19.0	21.6	18.4	21.7	18.1	22.6	18.7	22.2	17.2
40-59	9.6	8.3	9.6	8.2	8.8	8.0	8.4	6.6	13.0	9.7
60 and over	2.7	2.6	2.9	2.5	3.1	2.6	2.5	1.9	1.3	1.1

S O U R C E : Calculations based on data from Census of India, U.P. Provincial and Imperial Tables for various years.

TABLE XCVII

PERCENTAL AGE DISTRIBUTION BY SEX IN BULANDSHAHR DISTRICT
1901- 1951

Age-group	1901		1911		1921		1931		1951	
	M	F	M	F	M	F	M	F	M	F
1	2	3	4	5	6	7	8	9	10	11
0- 4	7.4	7.3	5.8	5.5	6.5	6.4	8.1	7.9	7.7	7.2
5- 9	7.6	6.6	7.3	6.4	7.4	6.4	6.7	5.5	6.5	5.9
10-14	5.9	4.5	7.5	5.8	6.3	4.6	6.3	5.0	6.8	5.6
Total (0-14)	20.9	18.4	20.6	17.7	20.2	17.4	21.1	18.4	21.0	18.7
15-19	4.2	3.4	5.2	4.6	5.0	4.2	4.9	4.4	4.6	4.3
20-39	15.9	15.0	15.0	14.0	16.0	14.8	16.8	15.3	14.6	13.3
Total (15-39)	20.1	18.4	20.2	18.6	21.0	19.0	21.7	19.7	19.2	17.6
40-59	9.1	8.0	9.3	8.5	8.8	8.3	8.1	7.0	12.1	9.6
60 and over	2.5	2.6	2.6	2.5	2.8	2.5	2.2	1.8	1.0	0.8

S O U R C E : Calculations based on data from Census of India, U.P. Provincial and Imperial Tables for various years.

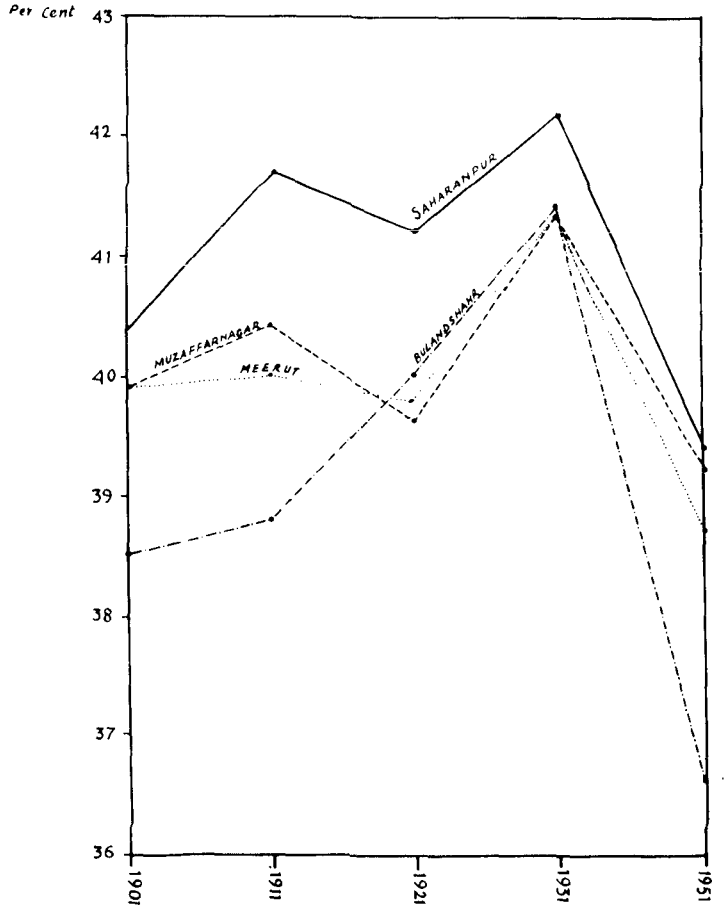
of the region. The decrease was greatest in Bulandshahr district where it amounted to 1.9 per cent relative to the 1901 proportion. Meerut district suffered the least having a loss of only 0.7 per cent whereas the decline in Saharanpur and Muzaffarnagar was 1.0 and 1.2 per cent respectively during the fifty-year period of 1901 to 1951. The decline has, however, not been steady or continued. The decline appears to have followed a wavy course of somewhat M-shape as shown by Fig.64 and table XCVIII. It will be seen from the Figure that 1911 and 1931 were the years of increase and the years 1921 and 1951 were the years of decline. In fact the all time maximum during the fifty years was attained in 1931 in each of the four districts whereas the all time minimum was reached in 1951. This loss in the young and middle age-group coupled with the increase in the lower age-group has made the population all the more immature and imbalanced. The decline in the age-group of 15-39 meant a decline in the productive force of the population whereas increase in the 0-14 years slab signified a growing burden of dependency.

TABLE XCVIII
DISTRICT-WISE PERCENTAGES OF GENERAL POPULATION
IN THE AGE-GROUP 15-39 FROM 1901 to 1951

District	Age-group 15 - 39				
	1901	1911	1921	1931	1951
1	2	3	4	5	6
Saharanpur	40.4	41.7	41.2	42.2	39.4
Muzaffarnagar	39.9	40.4	39.6	41.3	38.7
Meerut	39.9	40.0	39.8	41.3	39.2
Bulandshahr	38.5	38.8	40.0	41.4	36.6

S O U R C E : Calculations based on data from Census of India, U.P. Provincial Tables for various years.

DISTRICT-WISE INTERCENSAL VARIATION
IN
THE PROPORTION OF YOUNG MEN & WOMEN (15-39 YRS.).
1901-1951



Based on Tables XCIV-XCVII

FIG. 64

It is not easy or simple matter to give a complete explanation of this state of variation. It may, however, be emphasized that barring a few immigrants and emigrants the number of persons in the age-group of 20-29 and 30-39 represented the survivors of the age-groups of 0-9 and 10-19 of the 1931 census and of the age-group of 0-9 of the 1941 census whereas the numbers under the age-group of 0-14 in 1951 represented an actual addition (mainly natural because migration as noted earlier, was an insignificant factor in the growth of general population of Upper Doab) after the 1941 census plus the survivors of those returned under the first quinary group at 1941 enumeration. Thus the increase in the lower age-group in 1951 was indicative of a higher juvenile survival rate during the forties and the decrease in the young age-group, on the other hand, was suggestive of a lower survival rate and somewhat higher death-rate in the first and second decennial age-group during the thirties and forties of the century.[11] This expansion of the lower age slabs and contraction of the young age

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11. Two plausable explanations may be given for this behaviour of the population. Firstly, in spite of great improvement in the science of medicine and in the therapeutic and hygienic facilities the low economic standards of the general population has always been a great barrier in the way of having full benefits of these improvements for each and every member of the family. A selection of who should get the costly (advanced and improved) medication with the recommended diet, has, therefore, always been a forced necessity. Parental love invariably acted as the deciding factor and the children usually got priority in being given as good a treatment as the father's income and capacity to get loans, could afford, whereas for the maladies of the father or the mother it would be considered sufficient to have either an indigenous treatment of a self-styled or traditional vaid or hakim or an old woman (especially in the case of mothers) who has been held in great esteem for her knowledge of polychrists and tested and tried cures. Since the disposition of having qualified and improved therapy is a product of recent decades it were only the babies and children of the thirties and forties who received the benefit of this change of attitud

contd.

slabs of population pyramid has combinedly aggravated the progressive nature of the population. If this state of age-structure continues (and there is all likelihood of its continuing) one can easily foresee enormous additions to the population of this region during the coming decades.

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towards medication. This seems to be one probable cause of increase in the survival expectancy amongst the children of under 14 years during the last two decades of the first half of the century.

Secondly, high maternity deaths have in all probability been a major cause of this pattern of variation. It will be seen from table XCIV to XCVII that the decline in the young and middle age-group has been almost entirely amongst the female population of each district. For instance reference the statistical position may be re-tabulated in a modified form as follows:

District	Variation in age-group 15-39 relative to percentage at 1901 census (- decrease + increase)	
1	2	3
	Female	Male
Saharanpur	- 1.6	+ 0.6
Muzaffarnagar	- 1.2	- 0.1
Meerut	- 1.8	+ 1.3
Bulandshahr	- 0.8	- 0.9
Total	- 1.5	+ 0.4

~~666~~

It is clear from this table that the brunt of loss was almost entirely borne by the females whereas in the male population increase in two districts of Saharanpur and Meerut did more than compensate for the loss suffered by the other two districts.

This situation may apparently indicate a possible retardation in population growth in the years to come because the number of females of

contd.

3. SUNDBARG'S CRITERION

The type of dynamism of Upper Doab population may also be determined by the application of Sundbarg's classification of population into three types, namely, progressive, stationary and retrogressive. According to his formulation a normal population (that is a population which is not seriously disturbed by migrations) has about half of its total in the age-group of 15-49. The proportion of the persons in the age-group of 0-14 to those in the age-group of 50 and over determines as to whether the population is increasing, stationary or decreasing. If the population in the lower age-group is more than double of that in the upper age-group it is increasing or progressive; if the proportion is just double it is stationary; and if the proportion is less than double it is decreasing or retrogressive.

It will be seen from Table XCIX that the population of Upper Doab and its constituent districts was distinctly progressive. In 1931 the proportion between the lower and the upper age-group was almost 4:1 amongst the males and slightly higher than this amongst the females in all the districts of the region. Accordingly, therefore, the female population was comparatively more progressive than the male population in 1931. This fact is actually corroborated by the relatively high increase in females population as discussed in the earlier chapter. Among the

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11. contd.
reproductive age was declining. But the postulated retardation seems to be only apparent and least real as the rapid and large scale diffusion of modern hospital and health services and the change of attitude towards therapy might tend to increase the survival expectancy among the young age-groups also alongside with that amongst the lower age-groups and thus the majority of the teeming children of 1951 might be active reproducers by 1961 and 1971.

TABLE XCIX

AGE DISTRIBUTION (PERCENT) BY DISTRICTS UNDER GROUPS OF SUNDBARG'S CLASSIFICATION FOR 1931 and 1951

District	1931			1951		
	0-14	15-49	50 & over	0-14	15-49	50 & over
1	2	3	4	5	6	7
Saharanpur						
Male	38.6	51.7	9.7	39.5	48.6	11.9
Female	40.6	50.5	8.9	39.3	50.5	10.2
Muzaffarnagar						
Male	39.2	50.7	10.1	38.5	48.3	13.2
Female	41.4	49.6	9.0	40.6	49.1	10.3
Meerut						
Male	38.3	51.1	10.6	34.1	51.2	14.7
Female	40.4	49.7	9.9	36.2	49.5	14.3
Bulandshahr						
Male	39.8	50.0	10.2	38.8	46.7	14.5
Female	39.3	50.9	9.8	40.0	47.8	12.2
Upper Doab						
Male	38.9	50.9	10.2	37.7	48.8	13.5
Female	40.0	50.2	9.5	39.0	49.2	11.8
U.P.						
Male	39.0	51.0	10.0	38.2	49.0	12.8
Female	39.0	51.0	10.0	38.8	48.3	12.9

S O U R C E : Calculations based on data from:
a) Census of India 1931, U.P. Imperial and Provincial Tables,
b) District Census Handbooks 1951 of Saharanpur, Muzaffarnagar, Meerut and Bulandshahr,
c) Census of India 1951, U.P. Subsidiary Tables, p.185.
d) Census of India 1951, U.P. Report p. 360.

districts Saharanpur with proportions of 4.0 to 1 and 4.5 to 1 for males and females respectively was the most progressive whereas Meerut with 3.6 to 1 and 4.1 to 1 respectively was the least progressive in 1931. Muzaffarnagar with 3.8 to 1 and 4.6 to 1 and Bulandshahr with 3.9 to 1 and 4.0 to one in that order were on the whole almost equally placed in between the most and least progressive districts of the region.

From the table XCIX it is evident that the progressiveness has been decreasing since 1931 and in 1951 the progressive indices in all the districts have noticeably gone down.[12] The decline in the progressiveness should, however, be taken with some reservations because it is caused by increase in the percentage of higher age-group and not by any appreciable decrease in the percentage of the lower age slab. This is an important point. As the lower age-group percentage has not shown a comparable decrease the reservoir of potential reproducers was at least as great as it was two decades ago whereas the increase in the proportion of persons belonging to high age-groups indicated increasing longevity. It, may, therefore, be apprehended that despite a theoretical lessening in the progressive indices there seems no real signs of any actual check on progressiveness of population in this region.

A comparison with the age structure of the population of certain selected countries would be revealing and interesting. For this purpose those countries have been selected which are well known for a high progressiveness and for regressiveness of their population. In Table C

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12. Though " the smoothing of ages in 1931 had resulted in a general lowering of the higher ages (specially of females) so that the group 15-49 had become proportionally larger than it would otherwise had bee but even allowing for this the 1951 population would still appear to be less progressive than that of 1931." (Census of India, U.P., 1951, Report, p.360).

TABLE C

AGE DISTRIBUTION ACCORDING TO SUNDBARG'S CATEGORIES IN VARIOUS COUNTRIES OF THE WORLD

Region / Country	Sex	AGE - GROUP (Percent)		
		0 - 14	15 - 49	50 and over
Upper Doab 1951	Male	37.7	48.8	13.5
	Female	39.0	49.2	11.8
U.P., 1951	Male	38.2	49.0	12.8
	Female	38.8	48.3	12.9
Chile, 1940	Male	37.8	50.6	11.6
	Female	36.5	51.1	12.4
Peru, 1940	Male	43.6	45.9	10.5
	Female	40.7	46.7	12.6
Japan, 1948	Male	35.8	49.3	15.3
	Female	33.6	50.5	15.8
Belgium, 1949	Male	21.4	52.1	26.5
	Female	20.2	49.8	30.0
France, 1950	Male	23.3	52.4	24.2
	Female	21.2	47.7	31.1
U.K.(Eng. and Wales), 1948	Male	22.9	52.9	24.6
	Female	20.3	50.1	29.5

S O U R C E : Calculations based on data from (1) Census of India 1951, U.P., Subsidiary Tables, p.185, and District Census Handbooks 1951, and (2) United Nations Demographic Year-Book 1949-50, Table 4, pp.104-167.

proportions of the three age-groups of Sundbarg's formulation are set out for six countries of the world. It will be seen that in Chile and Peru (countries of rapidly increasing population) the degree of progressive--ness in 1940 was quite comparable with that of the Upper Doab in 1951. In fact Peru had the highest percentage in the age-group of 0-14 and the lowest in the Upper age-group. This indicated an abnormally high degree of progressiveness which was confirmed by later increase in the Peruvian population as indicated in table C1 according to which the country's population registered an increase of about 3,491,000 persons in twenty years from 1940 to 1959 or almost 50 per cent of the 1940 total at the decennial rates of about 23 and 21 per cent. Similarly Chile also multi-plied her population at the rate of about 22 and 21 per cent during 1940-51 and 1951-59 respectively. These growth percentages compared well with the corresponding percentages for Upper Doab which ran as about 17 and 18 respectively. On the contrary Belgium, France, and England and Wales which had some of the lowest percentages in the lower age-group and the highest (even higher than those of the 0-14 slab) in the Upper age-group at the close of the fifth decade, were countries of regressive population. According to the later census enumerations the population of these countries had very small increase of about 4,7 and 3 per cent respectively by the close of the sixth decade. This therefore amply shows that under the existing state of age-structure the population of Upper Doab is bound to increase at rates comparable to those of the Latin American countries of population explosion and has, therefore, a long way to go for acquiring the type of either Belgium or the United Kingdom.

TABLE C1

TOTAL POPULATION AND VARIATION IN UPPER- DOAB AND SELECTED COUNTRIES OF THE WORLD, 1940 to 1959/61

Region / Country	Year	Total population	Absolute Increase	Percent Increase
Upper Doab	1941	5,451,030	....	
	1951	6,356,505	904,475	17
	1961	7,510,756	1,154,251	18
Chile	1940	5,063,000		
	1951	6,185,000	1,122,000	22
	1959	7,465,000	1,280,000	21
Peru	1940	7,033,000		
	1951	8,690,000	1,657,000	22
	1959	10,524,000	1,834,000	21
Japan	1940	71,400,000		
	1951	82,900,000	11,500,000	16
	1959	92,740,000	9,840,000	12
Belgium	1940	8,301,000		
	1951	8,678,000	367, 000	4
	1958	9,053,000	375,000	4
France	1940	39,800,000		
	1951	42,056,000	2,256,000	6
	1959	44,970,000	2,914,000	7
U.K.(England and Wales)	1940	41,862,000		
	1951	44,008,000	3,146,000	8
	1958	45,244,000	1,236,000	3

SOURCE : (1) Census of India, U.P. 1941, 1951 and 1961
(2) U.N. Demographic Year-book 1959, Table 4,p.136 et seq.

4. WORKING FORCE AND BURDEN OF DEPENDENCY

According to the criterion adopted by the Government of India the number of all males in the age-group of 15 to 59 and half the number of females of this age-group constitute the working force of the country at any time.[13] In other words it means that the total of general population in the age-groups of 0 to 14 and 60 and over plus half of female population in the slab 15 to 59 constitutes the dependent non-working element of the country's population.

Examined on the basis of this criterion the population of Upper Doab is found to have undergone very little change during the first half of this century. However the slight change that has occurred has been on the defect of the proportion of working force. The proportions of the working force and the burden of dependency per thousand of general population are set out in table CII for the three census years of 1901, 1931 and 1951. The table shows that the working force in Upper Doab declined by 4 per mille in 1951 over that of 1901. From the table it is evident that the decline has been steady from 1901 and that it has been almost universal in the region with the single exception of Bulandshahr district which recorded an increase of 8 per mile in 1931. In this district, too, however the proportion in 1951 registered a decrease of about 3 per mille compared with the 1901 proportion. This trend in the working force was, due to the steady increase in both the upper and the lower age-groups of Sundbarg's categories. The working force as defined by age-groups refers simply to

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13. Wattal, P.K., Population Problem in India, A Census Study, New Delhi, 1958, p.92.

physical fitness for work and does not necessarily indicate the proportion of persons actually employed in gainfull pursuits. A more detailed analysis of occupational structure of Upper Doab's population will be attempted in the next chapter.

TABLE CII

PER MILLE DISTRIBUTION OF WORKING FORCE AND DEPENDENCY BURDEN BY DISTRICTS FOR 1901, 1931 AND 1951

District	1901		1931		1951	
	Working force (15-59)* per 1000	Burden of Dep--enden-cy per 1000	Working force per 1000	Burden of dependency per 1000	Working force per 1000	Burden of depend-ency per 1000
1	2	3	4	5	6	7
Saharanpur	432	568	426	574	419	581
Muzaffarnagar	425	575	421	579	416	584
Meerut	434	566	424	576	433	567
Bulandshahr	416	584	422	578	413	587
Upper Doab	427	573	424	576	423	577

* Figures have been adjusted according to the formulation that only half of the females in the age-group 15-59 are regarded as constituting the active working force. This accounts for the difference between these figures and the figures obtained from the columns 3 and 4 of table XCII.

S O U R C E : Calculations based on data from:
(a) District Census Handbooks 1951,
(b) Census of India, N.W. Provinces and Oudh 1901
(c) Census of India U.P. 1931.

Variations in the proportion of dependent and working ages seem to have been related to economic developments, urbanization and working force absorption capacity of the districts of the region. This fact is revealed by the interdistrict comparisons. Amongst the four districts Meerut was the only one where the proportion of under-fifteens registered a decline relative to the proportion at 1901 census. On the other hand the proportion of working force recorded some increase in 1951 only in Meerut and nowhere else. It has already been noted that the magnitude of urbanization and the associated economic and industrial developments were greatest in this district. It, therefore, appears that the immigration of the youth of over 15 years ~~years~~ age into this developing district from the adjoining areas reduced to some extent the burden of dependency in the district, but this factor was not equally operative in the remaining three districts. The relative position of the districts with regard to the percentages of the working force and the dependents is brought out by table CIII. From the table it will be seen that in 1951 both the highest proportion of working age-groups (58.8 per cent) and the lowest proportion of under-fifteens (34.3 per cent) were found in Meerut. This was a definite improvement of the position that existed in 1901, for in that year the corresponding proportions were 57.3 and 37.6 per cent. In other districts of Upper Doab the proportions of under-fifteens were about 39 per cent among males and 40 per cent among females compared with about 38 per cent for each of the two sexes in 1901. It is, therefore, evident that in the districts of Saharanpur, Muzaffarnagar and Bulandshahr the percentage of dependent age-groups has increased and proportion of working

TABLE CIII
DISTRICT-WISE PERCENTAGES OF DEPENDENT AND WORKING AGE-GROUPS FOR THREE CENSUSES 1901, 1931, 1951

District	Sex	1901			1931			1951		
		0-14	60 & over	15-59	0-14	60 & over	15-59	0-14	60 & over	15-59
1	2	3	4	5	6	7	8	9	10	11
Saharanpur	Male 100	37.2	5.0	57.8	38.6	4.1	57.3	38.9	5.3	55.8
	Female 100	37.4	5.4	57.2	40.6	3.6	55.8	39.3	4.7	56.0
Muzaffarnagar	Male 100	38.5	4.9	56.6	39.2	4.2	56.6	38.5	5.8	55.7
	Female 100	37.8	5.4	56.8	41.4	3.7	54.9	40.6	4.4	55.0
Meerut	Male 100	37.6	5.1	57.3	38.4	4.6	57.0	34.3	6.9	58.8
	Female 100	36.1	5.6	58.3	40.4	4.2	55.4	36.0	8.2	55.8
Bulandshahr	Male 100	39.8	4.8	55.4	39.9	4.1	56.0	38.9	6.0	55.1
	Female 100	38.9	5.5	55.6	39.3	3.9	56.8	40.0	5.1	54.9
Upper Doab	Male 100	38.2	5.0	56.8	38.9	4.3	56.8	37.2	6.1	56.7
	Female 100	37.4	5.5	57.1	40.3	3.9	55.8	38.6	5.8	55.6

S O U R C E : Calculations based on data from Census of India, U.P. 1901 and 1931 and District Census Handbooks 1951.

age-group has decreased during fifty years from 1901 to 1951. However these variations were rather small and on the whole the age structure of Upper Doab's population has remained fairly unchanged during the half -century period.

The proportion of youth in the population of Upper Doab of about 39 per cent in 1951 was quite comparable with 36.5 per cent found in the population of Japan in 1920 and with 36.1 per cent found in that of England and Wales in 1871.[14] For further comparisons reference may be made to third column of table C. It may be seen that in West European countries the burden of the non-productive youth has come down to about 20 to 21 per cent in 1950 from about 34 to 36 per cent of the seventees of the 18th century.[15] But in Upper Doab the trend has been rather of an opposite nature. Here the youth percentage has recorded an increase of about one per cent or so in the last fifty years. If this trend continues it would simply further aggravate the already disturbed balance between the juvenile and aged dependency and the working force.

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14. Taeuber, I.B., ' The Population of Japan', Princeton New Jersey, 1958, p.74.

15. ibid., p.74.

5. AGE STRUCTURE IN 1951

Sufficient reference has already been made to the age structure of the population in 1951 in the preceding paragraphs. However a rural urabn break up of the population of each district under broad age-groups and a district-wise statistical analysis of the quinary groups comparable to the figures given in table XCIII may here be added to what has been discussed in connection with the variation in the above paragraphs.

a) Distribution by districts

In 1951 the age structure of the population of Upper Doab did not differ much from that of the whole State of Uttar Pradesh. The close similarity between the age structures in Upper Doab and U.P. is revealed by the super imposed pyramid shown in Fig.65. However, some notable variations did exist among the districts of the region. Table CIV shows the quinquennial age-group distribution in each of the four districts of the region. The quinary age structure in the districts is shown by superimposed pyramids in Fig.66. From these pyramids and the table it will be seen that considerable inter-district variations existed in respect of age distribution. For instance in Saharanpur the male popula--tion in the lower age-slabs was substantially higher than the average for Upper Doab. Similarly the base of the pyramid for Bulandshahr district was a little broader than that for Upper Doab as a whole. The pyramid for Meerut was relatively well balanced: it had a substantially narrower base whereas in higher age-slabs it was a bit broader than that of Upper Doab. The age structure of Muzaffarnagar was almost identical with that of Bulandshahr save the fact that the 0-4 slab in this district was smaller than that of Upper Doab whereas that of Bulandshahr was a bit greater. The contrast in which the age structure of these districts stood with the structure of some developed countries of the world is

TABLE CIV
DISTRICT-WISE DISTRIBUTION OF POPULATION OF UPPER DOAB BY FIVE-YEAR AGE-GROUPS, 1951 (PER CENT OF GENERAL POPULATION)

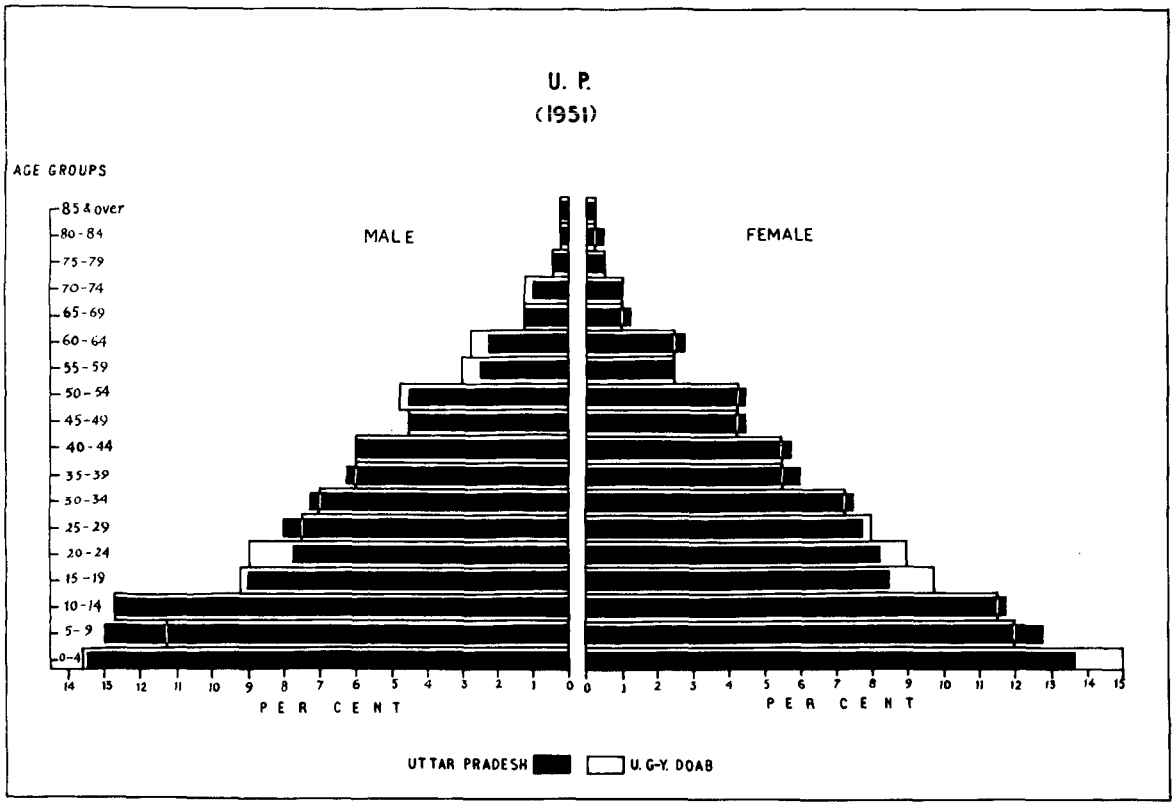
Age-group	Saharanpur		Muzaffarnagar		Meerut		Bulandshahr		Upper Doab	
	M	F	M	F	M	F	M	F	M	F
1	2	3	4	5	6	7	8	9	10	11
0- 4	8.8	6.8	7.4	6.7	7.0	6.6	7.7	7.2	7.6	6.7
5- 9	6.4	5.3	6.8	6.0	5.6	5.0	6.5	5.9	6.1	5.4
10-14	7.0	5.1	6.9	5.5	6.2	5.1	6.8	5.6	6.6	5.2
15-19	5.1	3.8	5.7	4.4	5.2	4.4	4.6	4.3	5.1	4.3
20-24	6.6	4.0	4.2	4.2	4.6	3.4	4.4	4.4	5.0	4.0
20-29	3.4	3.5	4.4	3.5	4.5	3.3	3.7	3.5	4.6	3.6
30-34	4.0	3.2	3.5	3.3	4.2	3.3	3.5	3.1	3.8	3.2
35-39	3.3	2.5	3.3	2.2	3.7	2.8	3.0	2.3	3.3	2.5
40-44	3.2	2.4	3.0	2.5	3.7	2.4	3.0	2.7	3.2	2.5
45-49	2.3	2.0	2.6	1.8	2.6	2.0	2.5	2.0	2.5	1.8
50-54	2.2	1.6	2.6	1.8	2.6	2.0	2.8	2.0	2.5	2.0
55-59	1.4	0.8	1.6	0.9	1.7	1.3	1.7	1.0	1.6	1.1
60-64	1.3	1.0	1.5	0.9	1.6	1.3	1.5	1.2	1.5	1.1
65-69	0.6	0.4	0.7	0.4	0.8	0.7	0.6	0.4	0.7	0.5
70-74	0.6	0.4	0.6	0.3	0.7	0.5	0.5	0.4	0.6	0.5
75-79	0.2	0.2	0.2	0.1	0.3	0.3	0.2	0.1	0.2	0.2
80-84	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.1
85 and over	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

S O U R C E : Calculations based on data from Census of India, U.P., District Census Handbooks 1951.

SEX AND AGE STRUCTURE

FOR

UPPER GANGA YAMUNA DOAB & UTTAR PRADESH



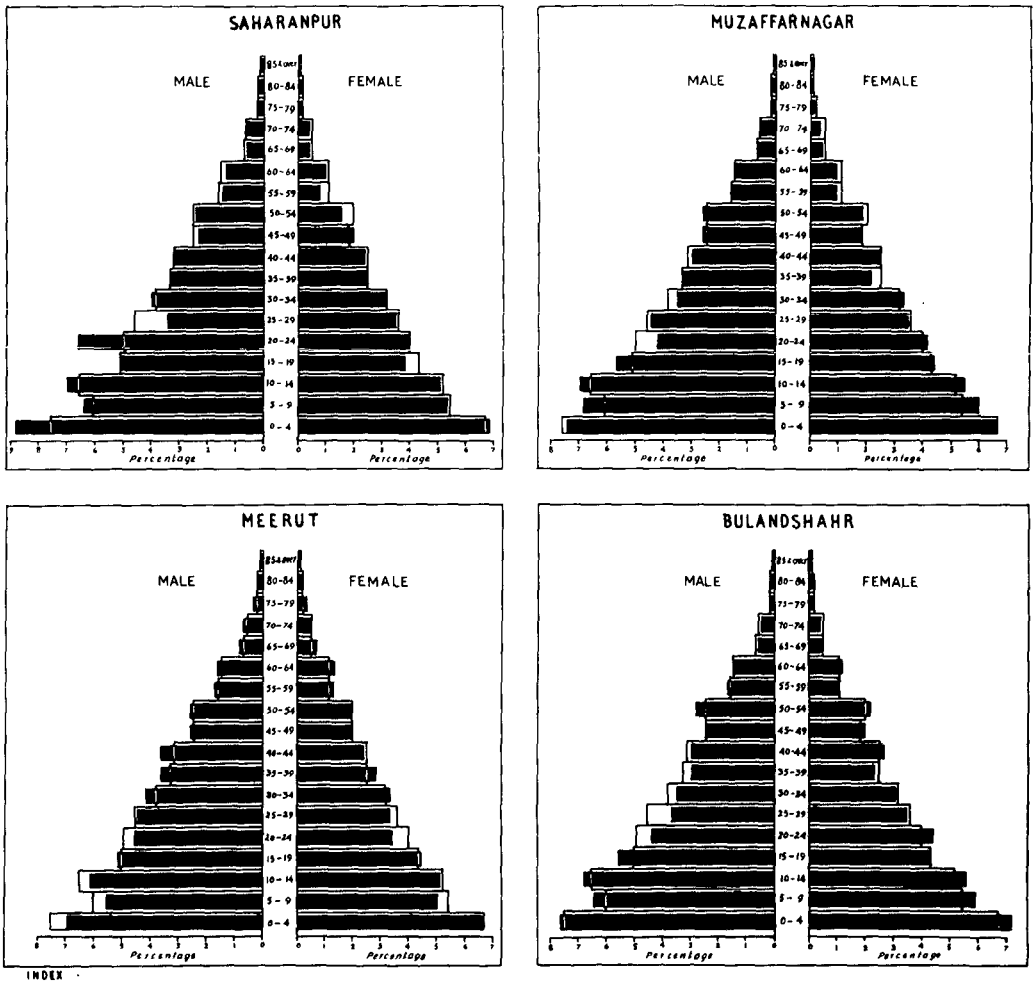
BASED ON TABLE X C III

FIG. 65

SEX AND AGE STRUCTURE

BY DISTRICTS

1951



(Based on Table XCIV)

FIG. 66

clearly impressed by comparison with Figs. 62,63 and 64 as, on the whole, the district pyramids did not differ much from the pyramid for Upper Doab taken as a whole.

TABLE CV
DISTRIBUTION IN CERTAIN BROAD AGE-GROUPS AS PERCENTAGE OF THE TOTAL OF ALL AGES IN RURAL AND URBAN POPULATION OF UPPER DOAB BY DISTRICTS, 1951

District	Rural/Urban	Sex	Age - group				
			Infant and young children 0-4	Boys & Girls 5-14	Young men & Women 15-34	Middle aged men & women 35-54	Elderl person 55 & over
1	2	3	4	5	6	7	8
Saharanpur	Rural	M	8.6	13.8	17.8	10.9	4.5
	100	F	7.0	10.5	15.5	8.5	2.9
	Urban	M	9.4	11.4	20.7	11.2	4.3
	100	F	6.5	10.5	15.0	8.1	2.9
Muzaffarnagar	Rural	M	7.6	13.9	17.6	11.3	4.6
	100	F	6.8	11.5	15.4	8.5	2.8
	Urban	M	7.0	13.6	19.4	11.6	5.0
	100	F	6.4	11.3	15.5	7.4	2.8
Meerut	Rural	M	7.6	12.3	16.8	12.2	5.6
	100	F	6.7	10.1	15.1	9.1	4.5
	Urban	M	4.9	9.1	23.5	13.8	5.0
	100	F	5.4	9.0	15.0	9.6	4.7
Bulandshahr	Rural	M	7.7	13.2	16.3	11.2	4.8
	100	F	7.3	11.5	15.3	9.2	3.4
	Urban	M	7.3	13.0	17.7	11.4	5.4
	100	F	6.7	11.1	15.0	8.8	3.6

S O U R C E : Adapted from Census of India, District Census Handbooks, 1951 Saharanpur, Muzaffarnagar, and Bulandshahr, p.ix, and Meerut p.x.

b) Rural - urban break up

The percentages of the numbers in each of the five age-groups namely infants and young children (0-4 years); boys and girls (05-14 years); young men and women (15-34 years); middle aged men and women (35-54 years); and elderly men and women (55 years and over) by district and residence are given in table CV. It will be noted from the table that the proportion of males in the young age-group (15-34) was substantially higher in the urban population compared with the rural population. This was mainly due to migration of workers and labourers to the towns from the villages. Since quite a good many of these workers were either unmarried or would not generally take with them the family members in their migrations the female proportions have not been much affected by such movements. If looked upon from a strict statistical point of view it may be noted, as being a fact of corroboration and verification of this relation between migration and urban-rural difference in age structure, that the proportions of females of the age-group of 15-34 in the rural population had a slight edge over the corresponding proportion in urban population in all the districts except Muzaffarnagar where it was nominally in defect by a mere 0.1 per cent. The excess of urban over rural proportions among the males seems to have varied according to the degree of urbanization in the district. The highest excess of 6.7 per cent was found in Meerut whereas in Bulandshahr it was the lowest being only 1.4 per cent. The intermediate values of 2.9 and 1.8 per cent were found in Saharanpur and Muzaffarnagar respectively. In earlier chapter it has been noted that in matters of urbanization and urban development

Meerut district stood at the highest rung and was followed in the second place by Saharanpur whereas Muzaffarnagar and Bulandshahr districts occupied the lowest positions in that order. This fact further confirms the position that the urban-rural disparity in the male proportions of the yonng working ages was mainly due to migrations from countryside.

A similar position though of much reduced degree appears to have existed between the rural and urban male proportions in the next working age-group of 35 to 54 years. The urban excesses in this age-group ranged between 1.6 and 0.2 per cent. Here too the same order existed: the maximum excess of 1.6 per cent was in Meerut. Saharanpur with 1.3 per cent occupied the second place whereas Muzaffarnagar and Bulandshahr with 0.3 and 0.2 per cent followed in the third and fourth place. The female proportions also varied likewise. In all the districts except that of Meerut the female proportions were a bit higher in the rural population compared with the urban population.

On the contrary the proportions of the total, male, and female population in the two lower age groups were generally higher in the rural than in the urban areas. This was mainly due to comparatively high birth-rate in the rural population as noted earlier. This rural-urban contrast is most ~~strikely~~ strikingly brought out by the comparison of the respective proportions for Meerut district. There the proportion of infants and children (both sexes combined) in the rural areas was higher than that in the urban areas by an average of 4 per cent (rural average 14.3 per cent; urban average 10.3 per cent). Similarly in the age-group of 5-14 years the rural percentage (22.4) exceeded

the urban percentage (18.1) by 4.3 per cent. This gives a combined rural excess of 4.3 per cent for the lower age-group of 0-14 years. The excess of rural proportions over urban ones decreased some what with the decrease in the urban level of the district. In Saharanpur the combined excess amounted to 2.4 per cent whereas in Muzaffarnagar and Bulandshahr it was 0.5 and 0.6 per cent respectively.

In the higher age-group of elderly persons there was no noteworthy difference in the urban and rural proportions. These proportions did not seem to follow any set pattern. The variations both in the total as well as sex-wise proportions were rather irregular from district to district.

CHAPTER IX

OCCUPATIONAL STRUCTURE

SECTION I - AGRICULTURAL OCCUPATIONS

The occupations pursued for earning livelihood may conveniently be grouped under two categories of agricultural and non-agricultural. The agricultural category in the present context refers to the four classes of occupations adopted by the census Superintendent in the 1951 census. These classes are as follows:

I. Cultivators of land wholly or mainly owned; and their dependents
II. Cultivators of land wholly or mainly unowned; and their dependents
III. Cultivating labourers; and their dependents
IV. Non-cultivating owners of land; agricultural rent receivers; and their dependents

Similarly the non-agricultural category comprises the following four classes adopted for 1951 enumerations:

V. Production other than cultivation
VI. Commerce
VII. Transport
VIII. Other services and miscellaneous sources

I. GENERAL

Agriculture occupies a predominant place in the economy of India and especially in that of Uttar Pradesh. In 1951 in the country as a whole 706 persons out of 1,000 were engaged in producing their own food and a small

surplus which was short of being sufficient for the remaining 294.[1] On the other hand in Uttar Pradesh as many as 469 laks out of 632 laks or 742 per mile of the total population of the State belonged to agricultural classes. The position of Upper Doab and its districts individually was, however, substantially different. According to 1951 census only 547 persons out of every thousand were dependent upon agriculture. This ratio of agricultural classes to the total population compared fairly well with the position in Japan where in 1947 the agricultural classes represented 526 persons per mille. Amongst the Indian States only Travancore -Cochin and West Bengal with 548 and 572 persons per mille in agriculture respectively enjoyed a comparable position in 1951. According to the Indian standards, therefore, the agricultural occupation could not be considered as predominant in this region. Table CVI compares the ratios of agricultural population (i.e. agricultural self-supporters plus earning and non-earning dependents) in Upper Doab and various States of India as returned in 1951 enumeration.

However comparison of the situation in Indian States (and the Upper Doab region) with that in certain selected countries of the world as drawn in the U.P. census of 1951 do not seem to be very valid. The per mille ratios for the countries of the world set out in table 168 on page 205 of the reports are calculated on the basis of the total economically active population[3]

1. Indian Census Report 1951, p.120.
2. Census of India 1951, Vol.II, U.P. Part I-A-Report p.205.
3. The definition of ' economically active population ' referred to in the foot-note of the report (Census of India 1951, U.P. p.205) is not exactly the same as that given in the U.N. Demographic Year Book 1949-50 on page 20 which reads: " The 'economically active population' refers to the working population (sometimes designated as ' labour force ' or the ' gainfully occupied population) and in general includes all persons working for pay or profit as well as workers paid in kind, unpaid family workers assisting in a family enterprise and unemployed persons seeking work. Women occupied solely in domestic duties, students, retired persons, pensioners, etc. are generally excluded." According to this definition only a particular class of unemployed (that is persons seeking work) and not all such persons are included in the ' economically active ' population. By inference it may also be seen that certain class of women and children of productive age are also not included. But the figures of Uttar Pradesh relate only to those of 'workers' (self-supporting persons plus earning dependents according to their secondaries).

whereas the per mille ratios for Indian States as contained in table 167 on the same page are calculated on the basis of the total population. A better and more suggestive comparison between various countries of the world and the State of Uttar Pradesh and the Upper Doab region may be drawn by noting the ratios of agriculturists (excluding non-earning dependents) to the total population of the state or the region.

TABLE CVI

DISTRIBUTION OF 1,000 PERSONS IN AGRICULTURAL AND NON-AGRICULTURAL CLASSES IN THE STATES OF INDIA 1951

State	Agricultural classes	Non-agricultural classes
1	2	3
India	698	302
Assam	733	267
Bihar	860	140
Bombay	615	385
Hyderabad	682	318
Madhya Bharat	722	278
Madhya Pradesh	760	240
Madras	649	351
Mysore	699	301
Orissa	793	207
Punjab	645	355
Rajasthan	709	291
Travancore-Cochin	548	452
Uttar Pradesh	742	258
Vindhya Pradesh	871	129
West Bengal	572	428
Upper Doab	547	453

S O U R C E : For states of India: Census of India 1951, Vol.II, U.P. Part I A-Report p.205.
For Upper Doab: Census of India 1951, Vol.II, U.P. Part II-A pp.114-121.

Table CVII gives such ratios for India, U.P., Upper Doab, and some selected countries of the world. From the table and Fig.67 it will be noted that the percentage of persons (19.0) actively engaged in various agricultural pursuits in Upper Doab in 1951 was almost equal to what it was in France in 1946

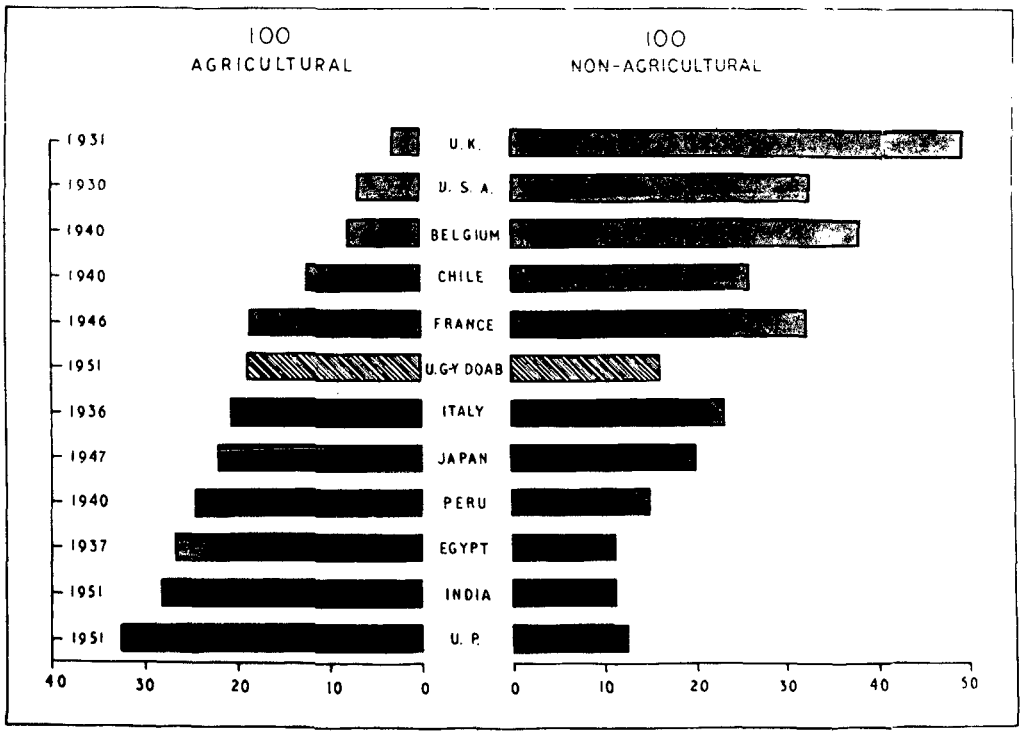
TABLE CVII

PERCENTAGES OF ECONOMICALLY ACTIVE POPULATION OR SELF-SUPPORTING AND EARNING DEPENDENTS OF AGRICULTURAL AND NON-AGRICULTURAL CLASSES IN SELECTED COUNTRIES OF THE WORLD, INDIA, U.P. AND UPPER DOAB.

Country/Region	Year	Agricultural class per 100 of the total population	Non-agricultural class per 100 of the total population.
1	2	3	4
Belgium	1930	7.9	38.5
Chile	1940	12.3	26.3
Egypt	1937	27.0	11.2
France	1946	18.8	32.7
Italy	1936	20.8	23.3
Japan	1947	22.2	20.2
Peru	1940	24.9	15.0
U.K.	1931	3.1	49.8
U.S.A	1940	7.0	33.0
India	1951	28.2	11.2
U.P.	1951	32.6	12.5
Upper Doab	1951	19.0	16.3

S O U R C E : For countries of the world the ratios have been calculated from the figures given in table 1 (pp.71-83) and 12 (pp.254-275) of the United Nations Demographic Yearbook, 1949-50.
For India, U.P.., and U.D. ratios are based on census statistics from Census of India 1951, General Tables; Census of India 1951, U.P. Pt. I-B-Subsidiary Tables; Distt. Census Handbooks 1951, and Census of India 1951 U.P. Pt.I-A Report pp.199 et seq.

PERCENTAGES OF ECONOMICALLY ACTIVE POPULATION OF AGRICULTURAL & NON-AGRICULTURAL CLASSES IN U.G-Y. DOAB & OTHER COUNTRIES OF THE WORLD



BASED ON TABLE CVII

FIG. 67

whereas it was substantially lesser than the corresponding percentages in U.P (32.6 in 1951), India (28.2 in 1951) Egypt (27.0 in 1937), Peru (24.9 in 1940) and Japan (22.2 in 1947).From the examination of the table it appears that the ratios of agriculturists tended to decrease with increase in urbanization and industrialization. It is probably for this reason that some of the lowest ratios of agricultural population to the total populatio were recorded in U.K. (3.1 per cent, 1931), U.S.A (7.0 per cent, 1940), and Belgium (7.9 per cent, 1930). This also seems to be the plausible explanation of fairly low agricultural ratio in Upper Doab relative to the ratio in the State to which it belongs. In the chapter on rural and urban population it has been noted that on the whole the urbanization in the districts of Upper Doab was considerably greater than the State average. The urban pull as a probable cause of relatively low agricultural proportion is also, indirectly, indicated by comparatively high percentage in the non-agricultural sector in this region. In this class of occupation the Upper Doab percentage was not only substantially higher than the corresponding proportions for India and U.P. but it was also appreciably above the ratio found in such countries as Egypt and Peru. However Upper Doab's 16.3 per cent in the non-agricultural classes was considerably small compared with the corresponding ratios in some of the industrially advanced countries such as U.K. (49.8 per cent 1931), Belgium (38.5 per cent, 1930), U.S.A. (33.0 per cent, 1940) and France (32.7 per cent, 1946).

As is evident from the table the deviation in the percentages of agricultural and non-agricultural classes from the state and national averages were not same. The negative deviation in the agricultural classes was noticeably greater than the positive diviation in the non-agricultural

classes. This situation calls for special attention as it indicated a disturbance in the urban-rural balance of the earlier times and if the economic growth in the non-agricultural sector is not proportionally stimulated this shattering of the balance may result in the shortage of the essential commodities of agricultural produce in the region. The situation of scarcity may also be warded off from developing by increasing agricultural efficiency. There seems considerable scope in this direction as the work of M. Shafi on the agricultural efficiency in the districts of the Ganga-Yamuna Doab and in variou States of India shows that the efficiency index in the districts of Upper Doab was still short of what it ought to be in order to produce as much surplus as to meet adequately the needs of the fast growing numbers of the non-food-producing food consumers.

2. VARIATION SINCE 1901

The classificatory system adopted for agricultural occupations has considerably varied from census to census and as such the statistics about the means of livelihood classes of agricultural population of various censuses are not directly comparable. In pre-1951 censuses agricultural occupations formed part of one general occupational classification and were divided into several groups and orders. The comparisons between figures for 1951 and previous census can, however, be secured by making certain adjustments in the major classes and groups of agricultural means of livelihood adopted for these censuses. Taking the 1951 classification as basis table CVIII is drawn to show the adjustments required for the comparison of the figures of previous censuses with those of the 1951. It will be noted from

TABLE CVIII

ADJUSTMENT FOR SECURING COMPARABILITY IN AGRICULTURAL MEANS OF LIVELIHOOD BETWEEN 1951 AND PREVIOUS CENSUSES.

Agricultural means of livelihood 1951	Agricultural occupational group, 1931	Agricultural occupational group, 1921	Agricultural occupational group, 1911	Agricultural occupational group 1901
1	2	3	4	5
I - Cultivation of owned land	5. Cultivating owners	2. Ordinary cultivators	2. Ordinary cultivators	10. Land holders and tenants
II - Cultivation of unowned land	6. Tenant cultivators			
	8. Cultivation of jhum, taungya and shifting areas			
III- Employment as cultivating labourer	7. Agricultural labourers	4. Farm servants 5. Field labourers	4. Farm servants and field labourers	11. Agricultural labourers
IV- Rent on agricultural land	1-A. Non-cultiva-ting proprie-tors taking rent in money or kind	1. Income from rent of agricultural land	1. Income from rent of agricul-tural land	No such class or group separately adopted.
	I-B. Non-cultiva-ting tenants taking rent in money or kind.			

S O U R C E : Census of India 1951, Vol.II U.P. Part I-A. Report p.202, and the Imperial Tables for N.-W. Provinces and Oudh, 1901, for United Provinces of Agra and Oudh, 1911, 1921 and 1931.

the table that the total of the means of livelihood I and II of 1951 is comparable to the total of groups 5,6 and 8 of 1931 and group 2 of 1911 and 1921 and sub-order 10 of 1901. Means of livelihood III is identical with group 7 of 1931,with the total of groups 4 and 5 of 1921, group 4 of 1911 and sub-order 11 of 1901. Means of livelihood IV of 1951 corresponds to the total of group I-A and I-B of 1931 and group 1 of 1911 and 1921; no such class or group was adopted in 1901 census. The nearest possible class to these groups used in 1901 was probably group 36 of sub-order V class B. Nevertheless it is almost impossible to have any reasonable measure of certainty in comparing group 36 (Zamindars) of 1901 with class IV of 1951 and its opposite numbers of other censuses as the Zamindars (of 1901 census) included both the rent receivers and ba jot khud or ba kasht khud (i.e., cultivators of owned land). With the figures for 1931 a further difficulty in comparison is encountered when district-wise dependence on agriculture is attempted. The 1931 census does not give the number of non-earning dependents classified by type of livelihood whereas such classified figures are available for censuses of earlier decades as well as for 1951. This is the reason why in the following discussion of variation in occupational structure and means of livelihood 1931 is left out.

Since 1901 the dependence on agriculture has been on the increase in Upper Doab as a whole and in two of its districts. The proportion of population dependent on agriculture for their livelihood was 46.7 per cent in 1901 but it rose to 54.7 per cent in 1951. The highest proportion of 55.3 per cent was recorded in the year 1921. Table CIX shows variations in the dependence on agriculture as percentages of the general population of Upper Doab

and its districts. It will be noted from the table that in all the districts the proportion continued to increase upto 1921 but thenceforth it declined in all the districts except Muzaffarnagar. The increase between 1911 and 1921 was due chiefly to the rise in the prices of agricultural products during first World War. During 1914 to 1921 the high prices allured the workers to move back to the village lands and caused such an appreciation in agricultural incomes that in many cases where the agricultural income had formerly been subsidiary it now rose to be the principal income. However between 1921 and 1931 the reverse process started. The adverse seasons and the collapse of the price level at the end of the decade drove the people from the villages to the towns and, in many cases, so much reduced the agricultural incomes that they no longer constituted the principal source of livelihood. The effect of this reverse process is reflected in the reduction of the proportion of dependents on agriculture in 1951 at which census they declined to become almost on par with the proportions at the time of 1911 census.

Besides the collapse in price level rapid urbanization, especially in the districts of Meerut and Saharanpur, which started at the beginning of the fourth decade also played a significant part in accelerating the rural influx into the towns and causing some reduction in the proportion of population depending on agriculture. This point is clearly indicated by the percentages in the districts of the region. In Saharanpur and Meerut the percentages declined from 52.6 and 57.2 in 1921 to 48.0 each in 1951 respectively whereas in Bulandshahr it decreased only nominally from 64.3 per cent in 1921 to 63.1 per cent in 1951. Muzaffarnagar in contradistinction to the three districts recorded substantially high increase from 55.0 per cent in 1921 to 64.9 per cent in 1951. The plausible explanation of relatively

high dependence on agriculture in the two districts of Muzaffarnagar and Bulandshahr seems to be in the comparatively limited opportunities of non-agrarian occupations due to slower and lesser growth of urban population and centres in these districts. The collapse of the price-level would have the same effect in the occupational structure of these districts also had there been similar opportunities of employment in the non-agrarian sector as they were made available in the districts of Saharanpur and Meerut. But such opportunities were lacking and consequently the dependency pressure on agricultural means of livelihood in Muzaffarnagar and Bulandshahr districts could not get ameliorated as it did in the other two districts of the region.

TABLE CIX
INTERCENSAL VARIATION IN THE PROPORTIONS OF THE POPULATION DEPENDING ON AGRICULTURE AS MEANS OF LIVELIHOOD BY DISTRICTS, 1901-1951

District	Percentage of population depending on agriculture in 1901	1911	1921	1951
Saharanpur	43.6	43.7	52.6	48.0
Muzaffarnagar	47.8	48.0	55.0	64.9
Meerut	48.6	55.5	57.2	48.0
Bulandshahr	50.1	60.8	64.3	63.1
Upper Doab	46.7	50.6	55.3	54.7

S O U R C E : Census of India 1951, U.P., District Census Handbooks, pp. viii-ix.

There was no legal bar on interdistrict migrations and it is quite likely that a good many persons from the rural areas of Bulandshahr and Muzaffarnagar would have crossed over into the adjoining districts of Meerut and Saharanpur[4] but freedom of movement alone is not potent enough to bring

4. No data for such movements are available.

about any substantial change in the livelihood pattern. Distance is infact more effective a factor. Rural people cannot easily afford or elect to be removed from their village lands by long distances. They however, would prefer to pursue professions other than agriculture if the opportunity for such occupation lies at hand.[5] Unfortunately these two districts did not have wide diffusion and development of cottage industries in the small size towns upto 1951. Impressed by this state of affairs Mr. Rajeshwari Prasad has suggested in the introduction to Muzaffarnagar District Census Handbook that "it is only by the diversion of population to cottage and other industries and by providing subsidiary occupations to agriculturists that the present severe disequilibrium in the economy of the district can be redressed."[6]

* * *

The increase in the dependency on agriculture in Upper Doab in 1951 compared with the position in 1901 (table C IX) has brought about intensive fragmentation of holdings. The number of persons dependent on agriculture increased to 3,485,964 in 1951 from 2,320,467 in 1901[7] or by 50.2 per cent while the cultivated area increased only by about 3 per cent. This high disparity in the rates of increase of agriculturalists and the cultivated area has resulted in progressive fragmentation of holdings as each cosharer or heir would invariably demand his share to be parcelled out from the propert The details and statistical analysis of this situation would be discussed in the following chapter dealing with the agricultural situation and pressure on land but it may, nevertheless, be noted here that this process of fragmentatic

5. This, it may incidentally be noted, emphasizes the need for wide dispersal of cottage industries in small towns.
6. Census of India 1951, District Census Handbook of Muzaffarnagar, p.VIII.
7. Census of India 1901, N.-W. Provinces and Oudh, Vol.XVI-A, Pt.II and Census of India 1951, U.P. District Census Handbooks.

of holdings has been a serious evil both to agriculture and the agriculturist. The method of partition of holdings has further aggravated the evil consequences of the process of fragmentation. As noted by Turner the general practice was that " each heir demanded his share of each item of the property, his share in every kind of soil, of every well, tank, house, grass and pasture-land, of roads and paths, and even of individual trees."[8] This system involved a number of disadvantages regarding the utilization of land and labour resources in addition to that of tying up the people to the land and thus retarding the chances of any substantial or noticeable amelioration in the pressure of dependency on agricultural occupations.

* * *

3. SITUATION IN 1951

Of the agricultural classes referred to at the beginning of this chapter class I, i.e. cultivators of land wholly or mainly owned; and their dependents accounted for the largest number of persons occupied in agricultural pursuits. This class consisted of tenants and such zamindars (i.e. landlords) as had more income from their sir and khudkasht than from the rental of land let out t tenants. The class II, namely cultivators of land wholly or mainly unowned and their dependents, occupied third place of importance as a means of livelihoo in agricultural occupations. This class comprised tenants of sir, sub-tenants, mortgagees and others who cultivated land over which they had no right of occupancy as sir or khudkasht holder or as tenant. Class III, cultivating

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8. Census of India 1931, U.P. of Agra and Oudh, Vol.XVIII Pt.I - Report,p.47.

labourers and their dependents was the second most important occupation after class I. This consisted of farm servants and field labourers (employed by the members of the class I or II) and their dependents. They had neither occupancy nor tenancy rights. Class IV of non-cultivating owners of land, agricultural rent receivers and their dependents was the most insignificant of the four classes. It included zamindars, whose main income came from rental of land let out to tenants, and the non-cultivating tenants who received rent in money or kind and their dependents.

Tables CX,CXI, CXII, and CXIII give the tahsil-wise distribution of actual number of persons in the four agricultural classes by sex and residence in the districts of Upper Doab in 1951. From these tables and Figs. 68 and 69 it will be seen that the proportions of persons in class I and class III generally varied directly and inversely with the agricultural prosperity of the tahsils respectively. The tahsils bordering on Yamuna or Ganga khadir as Nakur, Kairana, Jansath and Muzaffarnagar had among the lowest percentages of population in class I and among the highest percentages in class III. It has neen noted in detail in earlier chapters that these tahsils were relatively low placed in agricultural prosperity. Because of less favourable economic position the cultivators would usually send their children to the fields to work as agricultural labourers and this probably explains the high percentag of this class in such tahsils. Some of the very high percentages of agricultural labourers namely 31.0, 30.1, and 28.6 were found in the tahsils of Kairana, Muzaffarnagar, Nakur, and Jansath respectively.

On the contrary in tahsils of high agricultural prosperity the proportion under class I was very high touching 90 per cent level in a few ones. The percentages in class III was proportionately low. Hapur and Ghaziabad the two of agriculturally the most prosperous tahsils the proportions in class I were the highest being 90.0 and 89.9 per cent respectively. As a

PERCENTAGE DISTRIBUTION OF POPULATION BY AGRICULTURAL LIVELIHOOD CLASSES BY DISTRICTS 1951

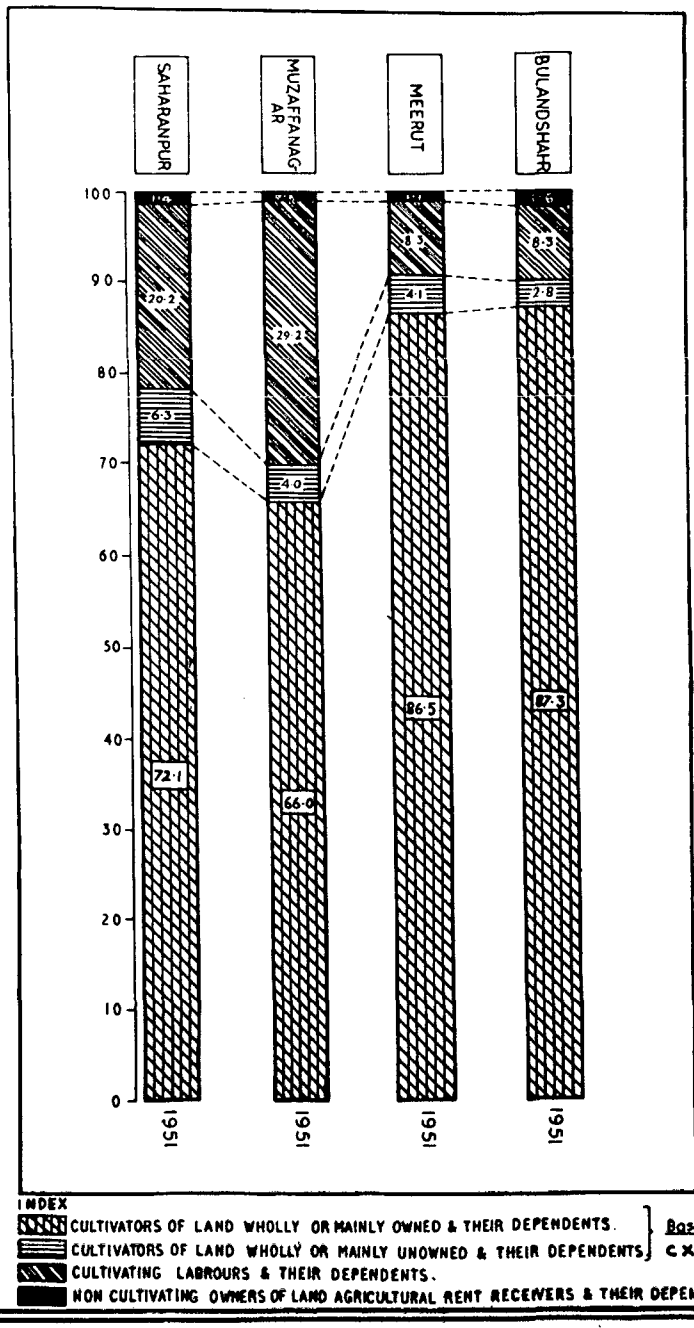
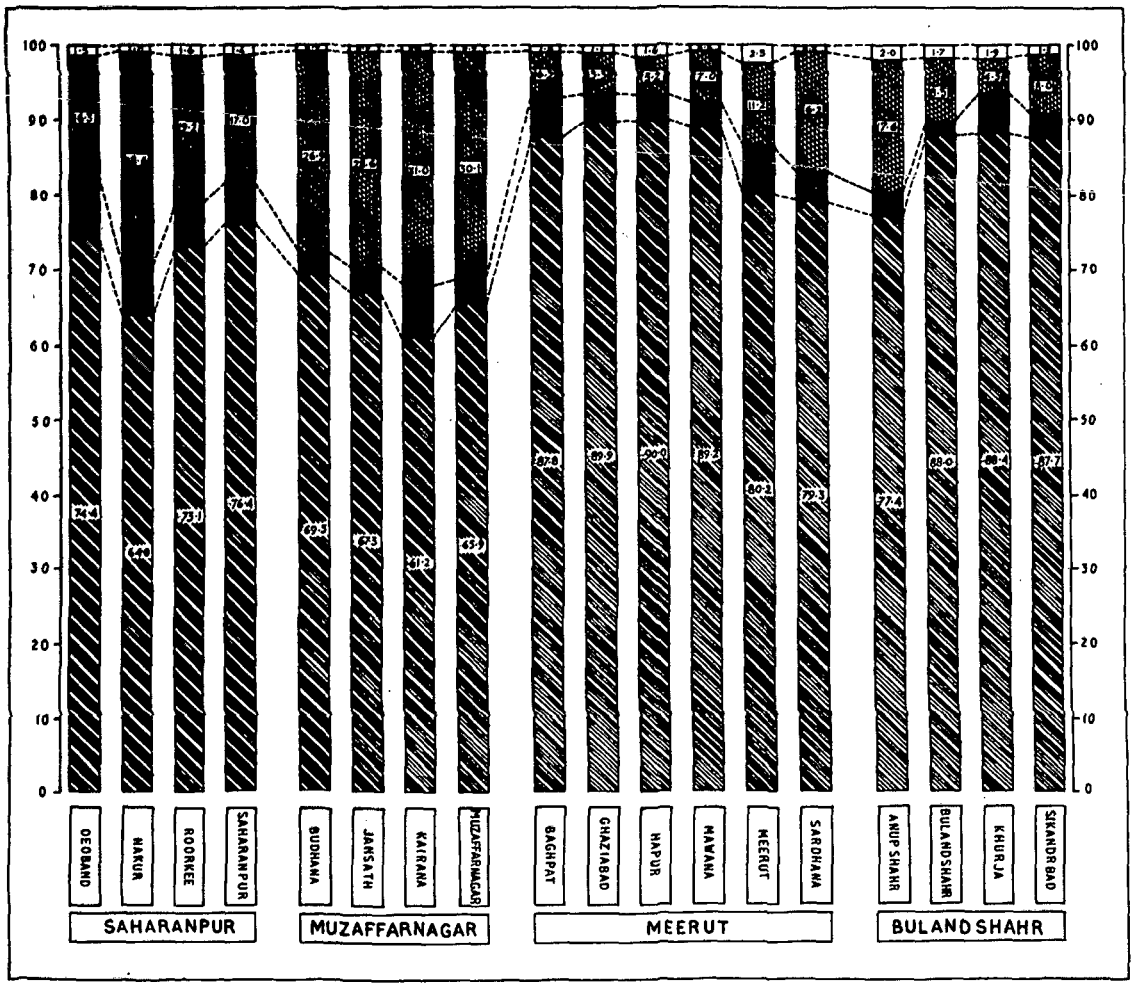


FIG. 68

PERCENTAGE DISTRIBUTION OF POPULATION
BY
AGRICULTURAL LIVELIHOOD CLASSES

BY TAHSILS

1951



INDEX

- NON CULTIVATING OWNERS OF LAND, AGRICULTURAL RENT RECEIVERS & THEIR DEPENDENTS.
- CULTIVATING LABROURS AND THEIR DEPENDENTS
- CULTIVATORS OF LAND WHOLLY OR MAINLY UNOWNED AND THEIR DEPENDENTS
- CULTIVATORS OF LAND WHOLLY OR MAINLY OWNED AND THEIR DEPENDENTS

BASED ON TABLES CX-CXIII

FIG. 69

TABLE CX

ABSOLUTE AND PERCENTAL DISTRIBUTION OF POPULATION OF THE DISTRICT AND TAHSILS OF SAHARANPUR BY AGRICULTURAL LIVELIHOOD CLASSES, 1951

Tahsil & District		I Cultivators of land wholly or mainly owned and their dependents			II Cultivators of land wholly or mainly unowned and their dependents.			III Cultivating labourers and their dependents			Non-cultivating owners of land, agricultural rent receivers and their dependents		
		Male	Female	% of Gen. Pop. (M-F)	Male	Female	% of Gen. Pop. (M-F)	Male	Female	% of gen. pop (M-F)	Male	Female	% of gen. pop. (M-F)
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Deoband	Total	57108	45635	74.4	6043	4933	8.0	12611	9876	16.3	853	969	1.5
	Rural	54516	43850	71.2	4898	4018	7.1	12201	9568	15.7	816	656	1.0
	Urban	2592	1785	3.2	1145	915	0.9	410	308	0.6	337	313	0.5
Nakur	Total	54801	44195	64.0	5473	4444	6.4	24499	19686	28.6	655	828	1.0
	Rural	52032	41871	60.7	4785	3881	5.6	22942	18513	26.8	331	489	0.5
	Urban	2769	2324	3.3	688	563	0.8	1557	1173	1.8	324	339	0.5
Roorkee	Total	74089	62138	73.1	6208	5186	6.1	19855	15841	19.2	1461	1538	1.6
	Rural	71894	60792	71.2	5160	4335	5.1	19682	15716	19.0	978	1175	1.2
	Urban	2195	1346	1.9	1048	851	1.0	173	125	0.2	483	363	0.4
Saharanpur	Total	69874	58965	76.4	4766	3971	5.2	15720	12560	17.0	1383	1368	1.4
	Rural	68360	57762	74.8	4053	3417	4.4	15418	12335	16.5	431	502	0.5
	Urban	1514	1203	1.6	713	558	0.8	362	225	0.5	952	866	0.9
District	Total	255872	210933	72.1	22490	18534	6.3	72685	57963	20.2	4352	4703	1.4
	Rural	246802	204275	69.6	18896	15647	5.3	70243	56132	19.5	2256	2822	0.8
	Urban	9070	6658	2.5	3594	2887	1.0	2442	1831	0.7	2096	1881	0.6

S O U R C E : Calculations based on data from Census of India 1951, Vol.II, U.P. Part II-A-General Population Tables, pp.114-120

TABLE CXI
ABSOLUTE AND PERCENTAL DISTRIBUTION OF POPULATION OF THE DISTRICT AND TAHSILS OF MUZAFFARNAGAR BY AGRICULTURAL LIVELIHOOD CLASSES, 1951

Tahsil & District		I Cultivators of land wholly or mainly owned and their dependents			II Cultivators of land wholly or mainly unowned and their dependents			III Cultivating labourers and their dependents			IV Non-cultivating owners of land, agr. rent receivers and their dependents		
		Male	Female	% of gen. total pop. (M-F)	Male	Female	% of Gen. Pop. total (M-F)	Male	Female	% of Gen. Pop. Total (M-F)	Male	Female	% of Gen. Pop. Total (M-F)
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Budhana	Total	68002	54633	69.5	2673	2104	2.7	25563	21881	26.9	729	781	0.9
	Rural	63557	51209	65.1	2127	1720	2.2	25314	21689	26.7	433	468	0.6
	Urban	4445	3424	4.4	546	384	0.5	249	192	0.2	296	313	0.3
Jansath	Total	72323	61655	67.3	3531	2929	3.2	31231	25673	28.6	762	858	0.9
	Rural	70339	60065	65.5	3334	2767	3.0	31167	25610	28.54	571	669	0.7
	Urban	1984	1590	1.8	197	162	0.2	64	63	00. 6	191	189	0.2
Kairana	Total	66540	54925	61.2	7388	6491	7.0	33809	27614	31.0	704	781	0.8
	Rural	62175	51384	57.2	6191	5483	5.9	32182	26360	29.6	358	398	0.4
	Urban	4365	3561	4.0	1197	1008	1.1	1627	1254	1.4	346	383	0.4
Muzaffarna-gar	Total	80060	66049	65.9	3783	3125	3.1	36606	30100	30.1	943	965	0.9
	Rural	76237	63566	63.1	2955	2525	2.5	36203	29788	29.8	511	619	0.6
	Urban	3823	2483	2.8	828	600	0.6	403	312	0.3	432	346	0.3
District	Total	286925	237262	66.0	17375	14649	4.0	127209	105268	29.2	3138	3385	0.8
	Rural	272308	226204	62.8	14607	12495	3.4	124866	103447	28.7	1873	2154	0.5
	Urban	14617	11058	3.2	2768	2154	0.6	2343	1821	0.5	1265	1231	0.3

S O U R C E : Calculations based on data from Census of India 1951, op.cit.

TABLE CXII

ABSOLUTE AND PERCENTAL DISTRIBUTION OF POPULATION OF THE DISTRICT AND TAHSILS OF MEERUT BY AGRICULTURAL LIVELIHOOD CLASSES
1951

Tahsil & District		I Cultivators of land wholly or mainly owned and their dependents.			II Cultivators of land wholly or mainly unowned and their dependents			III Cultivating labourers and their dependents			IV Non-cultivating owners of land, agricultural rent receivers and the dependents		
		Male	Female	% of gen. pop. (M-F) to agr.pop.	Male	Female	% of gen. pop. (M-F) to agr.pop.	Male	Female	% of gen. pop. (M-F) to agr.pop.	Male	Female	% of gen. pop.(M-F) to agr.pop.
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Baghpat	Total	108565	87905	87.8	6139	5022	5.0	7528	6392	6.2	1012	1087	1.0
	Rural	101252	83113	82.4	5125	4236	4.2	7323	6257	6.1	831	912	0.9
	Urban	7313	4792	5.4	1014	786	0.8	205	135	0.1	181	175	0.1
Ghaziabad	Total	96623	81298	89.9	3773	3182	3.5	6052	4802	5.5	924	1210	1.1
	Rural	94268	79598	87.9	3182	2609	2.9	5697	4618	5.2	732	886	0.8
	Urban	2355	1700	2.0	591	573	0.6	355	184	0.3	192	324	0.3
Hapur	Total	92755	79929	90.0	3455	2639	3.2	5458	4477	5.2	1100	1722	1.6
	Rural	89326	77158	86.8	2739	2096	2.6	4951	3992	4.7	886	1176	1.2
	Urban	3429	2771	3.2	716	543	0.6	507	485	0.5	214	546	0.4
Mawana	Total	78730	67141	89.2	2703	2165	3.0	6318	5110	7.0	572	784	0.8
	Rural	73706	63092	83.7	2417	1918	2.7	5951	4820	6.6	384	585	0.6
	Urban	5024	4049	5.5	286	247	0.3	367	290	0.4	188	199	0.2
Meerut	Total	60519	50916	80.2	4734	4039	6.3	8738	6815	11.2	1660	1518	2.3
	Rural	57834	49000	76.9	3460	2783	4.5	7359	5891	9.6	478	618	0.8
	Urban	2685	1916	3.3	1274	1256	1.8	1379	924	1.6	1182	900	1.5
Sardhana	Total	75863	62298	79.3	3596	2810	3.7	15598	12744	16.2	641	684	0.8
	Rural	73663	60347	76.9	3180	2524	3.3	15056	12385	15.7	576	608	0.7
	Urban	2200	1951	2.4	416	286	0.4	542	359	0.5	65	76	0.1
District	Total	513055	429487	86.5	24400	19857	4.1	49692	40340	8.3	5909	7005	1.1
	Rural	490049	412308	82.8	20103	16166	3.4	46337	37963	7.8	3887	4785	0.7
	Urban	23006	17179	3.7	4297	3691	0.7	3355	2377	0.5	2022	2220	0.4

S O U R C E : Calculations based on data from Census of India 1951, op.cit.

TABLE CXIII
ABSOLUTE AND PERCENTAL DISTRIBUTION OF POPULATION OF THE DISTRICT AND TAHSIL OF BULANDSHAHR AGRICULTURAL LIVELIHOOD CLASSES, 1951

Tahsil & District		I Cultivators of land wholly or mainly owned and their dependents			II Cultivators of land wholly or mainly unowned and their dependents			III Cultivating labourers labourers and their dependents.			IV Non-cultivating owners of land, agricultural rent receivers and the dependents.		
		Male	Female	% of gen. pop. (M-F) to agr. pop.	Male	Female	% of gen. pop. (M-F) to agr. pop.	Male	Female	% of gen. pop. (M-F) to agr. pop.	Male	Female	% of gen pop. (M-F) to agr. pop.
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Anupshahr	Total	123359	110043	77.4	2837	2304	3.0	16733	13582	17.6	1533	1944	2.0
	Rural	117360	104906	71.0	2567	2075	2.7	16195	13142	17.0	1223	1621	1.6
	Urban	5999	5137	6.4	270	229	0.3	538	440	0.6	310	325	0.4
Bulandshahr	Total	126797	108733	88.0	2799	2205	1.8	12683	9974	8.5	1989	2362	1.7
	Rural	120919	103803	84.0	2217	1730	1.4	11969	9388	8.0	1281	1669	1.1
	Urban	5878	4930	4.0	582	475	0.4	714	586	0.5	708	693	0.6
Khurja	Total	83446	82577	88.4	5686	4668	5.2	5270	3780	4.5	1738	1955	1.9
	Rural	88779	78915	84.2	5014	4124	4.6	4452	3123	3.8	1140	1507	1.4
	Urban	4667	3662	4.2	672	544	0.6	818	657	0.7	598	448	0.5
Sikandarabad	Total	98585	83848	87.7	3503	2795	3.0	9001	7531	8.0	1183	1451	1.3
	Rural	95626	81400	85.1	3190	2517	2.7	7910	6555	7.0	988	1264	1.1
	Urban	2959	2448	2.6	313	278	0.3	1091	976	1.0	195	187	0.2
District	Total	442187	385201	87.3	14825	11972	2.8	43687	34867	8.3	6443	7712	1.6
	Rural	422684	369024	83.5	12988	10446	2.5	40526	32208	7.7	4632	6061	1.2
	Urban	19503	16177	3.8	1837	1526	0.3	3161	2659	0.6	1811	1651	0.4

S O U R C E : Calculations based on data from Census of India 1951, op.cit.

matter of fact the proportion of population in this class was very high in all the tahsils of Meerut - the most prosperous district of Upper Doab. Because of relatively favourable economic position the cultivators were not pressed to get their children employed as cultivating labourers in the fields This to some extent explains the very small percentages of about 5 or so under class III in these tahsils against about 30 noted in case of Muzaffarna

The proportions of persons driving their livelihood from class II and IV did also vary quite noticeably from tahsil to tahsil though by themsel they were insignificant and did nowhere exceed 8.0 per cent and 2.3 per cent respectively. The tahsil-wise variations did not follow any regular, set, or explicable pattern. Though irregular as it was, it, however, appears that the areal variation of percentages in these classes or especially in class II was inversely related to that of percentages in class I. It may also be noted that the percentage of class II as means of livelihood was highest in the tahsils of the submontane district of Saharanpur and tended to decrease southwards. Deoband tahsil with 8.0 per cent topped the list of tahsils while Bulandshahr tahsil returned the lowest percentage of only 1.3. On district level Saharanpur had the highest percentage of 6.3 whereas Bulandsha again recorded the lowest proportion of 2.8 per cent. This areal distributio was in general comformity with the regional pattern of incidence of this livelihood class in the State as a whole. In the natural division of Hills and Plateaus the percentages of persons emmerated as cultivators of land wholly or mainly unowned and their dependents was as high as 9.62 whereas in the division of West Plain the percentage was the lowest in the State being only 5.08 per cent.

4. The Economic Status of Persons Dependent on Agriculture

Of the population enumerated as depending upon agriculture as means of livelihood the majority was of those who were non-earning dependents.[9] The earning dependents[10] had the lowest proportion whereas the ratio of the self-supporting[11] persons was a little less than half that of the non-earning dependents. Table CXIV gives percental distribution of persons driving their livelihood from agricultural occupations amongst self-supporting persons, earning dependents, and non-earning dependents by districts for 1951. From the table and Fig.70 it will be seen that in Upper Doab as a whole more than 65 per cent were non-earning dependents. The proportion of self-supporting persons was only 30.5 per cent whereas earning dependents accounted for a paltry 3.8 per cent. Though the position in Upper Doab with regard to self-supporting persons was almost identical with what it was in U.P. as a whole but the proportion of non-earning dependents in Upper Doab was almost 10 per cent higher than the State average whereas the percentage of earning dependents was a little over 10 per cent less than the average State percentage.

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9. A person who does not earn any income either in cash or kind is a non-earning dependent.' (Census of India, 1951, Vol.II, U.P. Part I-A, Report, Appendix I. p.452.
10. A person who secures a regular (and not casual) income either in cash or kind is an ' earning dependent ' if that income which he secures is by continuous or seasonal employment is in no case deemed to be sufficient to support that person.(ibid.p.45.2)
11. A ' self-supporting' person is one who is in receipt of an income and that income is sufficient at least for his own maintenance. To be (self-supporting ' a person need not be able to support his family. All that is necessary is that he should be earning sufficient for his personal needs. For purposes of this question the person enumerated is the unit and not the family or house-hold! (ibid. p.452).

DISTRIBUTION OF AGRICULTURAL POPULATION
IN
U. G.Y. DOAB & UTTAR PRADESH

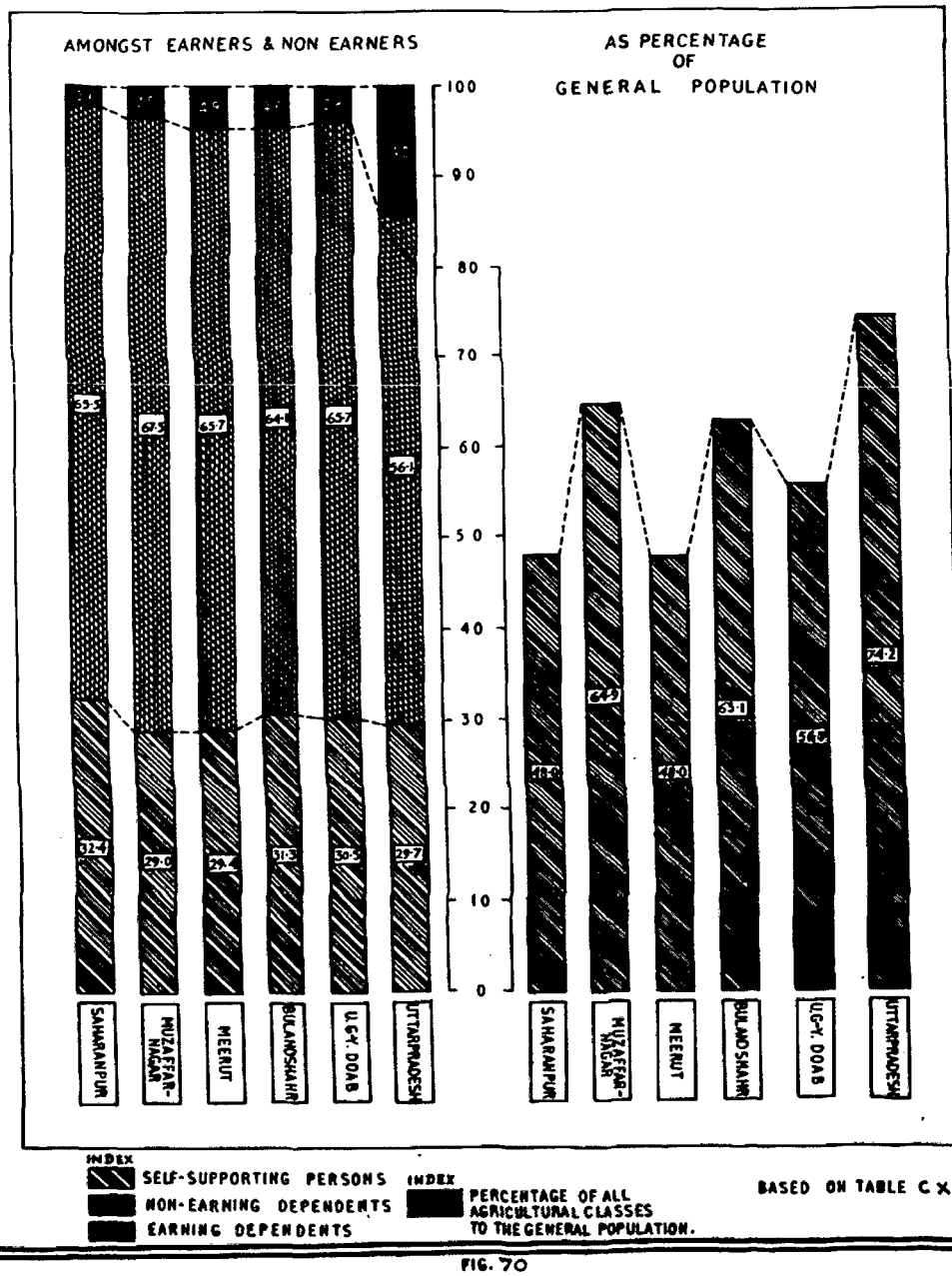

FIG. 70

TABLE CXIV

PERCENTAL DISTRIBUTION OF PERSONS IN ALL AGRICULTURAL CLASSES AMONGST SELF-SUPPORTING PERSONS, EARNING DEPENDENTS AND NON-EARNING DEPENDENTS IN THE DISTRICTS OF UPPER DOAB AND THE STATE, 1951

District	% of all agricultural classes to the general popula-tion.	Percentage of all agricultural classes of		
		Self-supporting persons	Non-earning dependents	earning dependent
1	2	3	4	5
Saharanpur	48.0	32.4	65.5	2.1
Muzaffarnagar	64.9	29.0	67.5	3.5
Meerut	48.0	29.4	65.7	4.9
Bulandshahr	63.1	31.3	64.1	4.6
Upper Doab	54.7	30.5	65.7	3.8
U.P.	74.2	29.7	56.1	14.2

S O U R C E : Calculations based on data from Census of India 1951, U.P.
(1) District Census Handbooks and
(2) Vol.II, Part-I-B- Subsidiary Tables, p.74.

The district-wise distribution (table CXIV) shows that there was but little regional variation in the structure of agricultural population by economic status. The proportion of self-supporting persons ranged between a maximum of 32.4 per cent in Saharanpur and a minimum of 29.0 per cent in Muzaffarnagar. Similarly the difference in the percentages of the earning and non-earning dependents did not exceed 2.8 and 3.4 per cent respectively. Saharanpur had the lowest percentage (2.1) of earning dependents whereas the lowest percentage of non-earning dependents (64.1) was found in Bulandshahr. Meerut had the highest proportion of earning dependents (4.9) and Muzaffarnagar had the lowest proportion of self-supporting persons (29.0). It may, therefore, be appreciated that the regional variations within the Upper Doab were not very substantial and the district proportions were quite close to the Upper Doab average.

The proportions of earning and non-earning dependents in Upper Doab and its districts stood in noticeable contrast with the respective State averages.[12]

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12. The high percentage of earning dependents in the State as a whole result of some of the abnormally high percentages of this class found in the districts of the Himalayan region. The Himalayan division was the only region where the earning dependents exceeded the self-supporting persons and accounted for almost 30 per cent of the total agricultural population. The districts of Hills and Plateau division also played a significant part in raising the State average of this class. In this region the earning dependents were found to be about 22.2 per cent of the total agr. population. The causes of these high proportions in these divisions are: (1) In the Himalayan and Hills divisions the active participation of women in agricultural activities is neither despised nor discouraged by the social customs and values in the region. Consequently women take unusually active part in agricultural works. Incidentally the proportion of women in the working age-group in the Himalayan districts was the highest among the State divisions being 55.04 per cent of the total female population; (2) the percentage of children in the non-working age-group (0-14) was the second highest in the Hills and Himalayan divisions (to which the Upper Doab belongs) and due to less favourable economic circumstances the

The circumstances causing this contrast aside, the high percentage of non-earning dependents in Upper Doab was to some extent due to greater prosperity and efficiency of agriculture and agriculturalists in the region. From the table it will be seen that in principle 34.3 per cent (self-supportin persons plus earning dependents) of the total agricultural population in Upper Doab carried the burden of supporting the remaining 65.7 per cent agricultural population in addition to its ownself whereas in the State as a whole 43.9 per cent of the agricultural population was under the burden of supporting the remaining 56.1 per cent agricultural population in addition to its ownself. But, nevertheless, this also indicates the enormous pressure of the non-productive element of population which strained the agricultural resources of Upper Doab in 1951 and which in all probability would continue to strain the agricultural situation in the region in the years to come.

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the cultivators of Hills and Mountain districts usually send their children to the fields as labourer whereas in the Western Plain districts quite a good number of the farmers' children are sent to schools and colleges in the nearby towns whereupon they remain non-earning dependents; and (3) in the West Plain active participation of women in agriculture is considered a social disgrace: the farmers of this region generally belong to the so called higher castes and, therefore, would not normally allow their females to participate in agricultural operations and, even where they do, would not report it to the census enumerators.

These circumstances have caused the percentage of earning dependents to rise and that of non-earning dependents to go down in the State as a whole and hence the contrast between the Upper Doab and U.P. in respect of these two classes of persons depending on agricultural means of livelihood.

This great burden of dependency of the non-earning class varied but little in various agricultural classes. The class-wise break up of the proportion of self-supporting persons, earning dependents and non-earning dependents for each district of Upper Doab and for the State is set out in table CXV. In all the classes the proportion of the non-earning dependents was more than double that of the self-supporting persons. It may, however, be noted that the proportion of non-earning dependents was highest in class I and declined gradually from class to class becoming minimum in class IV. Exactly similar pattern existed in Saharanpur and Muzaffarnagar districts. Meerut and Bulandshahr districts showed a slight deviation from this pattern as in these districts the percentages touched the minimum in class III and recorded a slight increase in class IV. This latter pattern was, however, identical with that of the State as a whole. The self-supporting persons were most numerous in class IV wherein their percentage ranged from 39.9 in Saharanpur to 31.3 in Meerut giving 35.9 per cent as the average for Upper Doab as a whole. This was also the position in the State where the percentage calculated to 38.5. The proportion of the self-supporters was minimum in class I but did not differ materially from that in class II. The proportion in these two classes was very much about 30 per cent. This indicated to some extent the supporting capability of each of the four agricultural classes. Evidently the cultivation of land whether owned or unowned had the higher supporting potency than either the work as labourers in the fields or mere dependence on agricultural rents. However, this assessment is subject to certain qualifications. That the cultivating labourers have the lowest capacity to support the non-productive members of population is beyond doubt. This is because the wages on which the labourer is recruited in the villages are usually so low that the supporting capacity of such labourers is much limited even when granted for extremely

TABLE CXV

PERCENTAL DISTRIBUTION OF PERSONS OF AGRICULTURAL LIVELIHOOD CLASSES AMONGST SELF-SUPPORTING PERSONS, EARNING DEPENDENTS, AND NON-EARNING DEPENDENTS

1951

District	Class I Cultivators of land wholly or mainly owned			Class II Cultivators of land wholly or mainly unowned			Class III Cultivating labourers			Class IV Non-cultivating owners of land agricultural rent receivers		
	Self-Supporting persons	Earning dependents	Non-earning dependents	Self-supporting persons	Earning dependents	Non-earning dependents.	Self supporting persons	Earning dependents	Non-earning dependents.	Self supporting persons	Earning dependents.	Non-earning dependents.
1	2	3	4	5	6	7	8	9	10	11	12	13
Saharanpur	31.48	1.88	66.64	30.51	3.04	66.45	35.54	2.81	61.65	39.91	2.62	57.47
Muzaffarnagar	27.95	3.52	68.53	27.80	4.04	68.16	31.18	3.49	65.33	35.30	2.15	62.55
Meerut	29.27	4.72	66.01	30.17	4.72	65.11	29.72	7.40	62.88	31.34	3.44	65.22
Bulandshahr	30.77	4.67	64.56	32.27	4.53	63.20	36.00	4.53	59.47	37.10	1.32	61.58
Upper Doab	29.87	3.70	66.43	30.19	4.08	65.73	33.11	4.56	62.33	35.91	2.38	61.71
U.P.	28.84	14.13	57.03	30.44	16.93	52.63	36.61	14.27	49.12	38.05	3.42	58.53

S O U R C E : Calculations based on data from Census of India 1951, Vol. II, U.P. Part I-B-Subsidiary Tables, pp.78-85.

simple life of this class. The low proportion of non-earning element in class IV may be attributed to some extent to style of living of the agricultura rent receivers and non-cultivating owners of land which is relatively more money-oriented, less simple and has some marks of urban sophestication.

The significant point to note, however, is that the dependency burden of non-earning persons in Upper Doab at the time of 1951 census was to the tune of more than 65 per cent of the agricultural population. This dependency did vary from area to area and from class to class but such variations were rather insignificant and in all classes and in all tahsils the pressure of non-earning members was almost in the ratio of 2:1 with the self-supporting and earning members of the population.

5. SECONDARY MEANS OF LIVELIHOOD

In each of the four agricultural classes discussed above a substantial number of persons were recorded as pursuing more than one occupation. To give full emphasis to combination of occupations the means of livelihood have been divided into two categories of principal and secondary or subsidiary. Accordin to the scheme adopted for 1951 census when a person reported more than one occupation the most lucrative was recorded as his principal and the next most lucrative as his secondary means of livelihood. The secondary occupations have also been divided into the same eight classes in which the principal ones have been divided as listed in the beginning of this chapter. Considering all the four principal agricultural classes and the seven secondary classes

(neglecting the one which is identical with the principal class) and taking two classes one each from principal and secondary means, the possible combination would be 28 in number.[13] The tabulation of all these possible combinations will thus result in a cumbersome table which would become all the more unwieldy when a break-up into earning and non-earning dependents of each combination is attempted. It is, therefore, proposed to confine the discussion of secondary means of livelihood to the two major categories of agricultural and non-agricultural only. This will cut down the number of possible combination to 8 which is easily manageable.

The secondary means of livelihood have a special significance in the economy of an agricultural region like the Upper Ganga-Yamuna Doab. Because of the seasonal character of agricultural operations the agriculturists have periods of intensive work alternated by periods of very light or perhaps no work. The utilization of this somewhat off period for productive purposes is a matter of considerable importance and the proportion of persons pursuing a secondary occupation may give some idea as to the extent to which the off periods were gainfully utilized and may thus also provide a measure of the economic prosperity of the people and the supporting capacity of the principal occupation in the region: With given opportunities of subsidiary occupation the greater the lucre of a principal means of livelihood the lesser is the need for secondary professions.

Table CXVIgives percentages of population of the four agricultural classes which returned a secondary means of livelihood (both self-supporting persons and earning dependents) at 1951 census in the districts of Upper Doab. For the sake of comparison the respective percentages in the State and the natural divisions of the State are also given. It will be seen from the table that the proportion of secondary occupations in the West Plain

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13. The number of combinations may be calculated from the formula:
$${}^{11}C_2 - {}^{7}C_2 - {}^{4}C_2 .$$

TABLE CXVI

PERCENTAGE OF PERSONS OF AGRICULTURAL LIVELIHOOD CLASSES WHO RETURNED SECONDARY MEANS OF LIVELIHOOD BY DISTRICTS OF UPPER DOAB AND NATURAL DIVISIONS OF UP, 1951

District & Natural Division	Agricultural means of livelihood							
	Class I 100		Class II 100		Class III 100		Class IV 100	
	With agri. secondaries	With non-agri. sec.	With agri. sec.	With non-agri. sec.	With agri. sec.	With non agri. sec.	With agri. sec.	With n agri. sec.
1	2	3	4	5	6	7	8	9
Saharanpur	1.89	0.97	2.86	1.86	2.01	1.60	1.92	5.05
Muzaffarnagar	3.49	0.96	3.89	1.60	2.51	1.60	2.97	4.59
Meerut	4.74	1.36	4.12	3.25	5.81	4.95	2.72	6.33
Bulandshahr	4.74	2.19	5.11	3.94	4.57	2.92	2.62	6.44
Upper Doab	3.71	1.37	3.99	2.66	3.72	2.77	2.56	5.60
U.P.	14.28	4.33	17.26	7.78	14.38	4.13	4.31	6.35
Central Plain	16.44	4.63	18.81	8.12	19.65	3.88	5.35	6.09
East Plain	19.79	5.36	20.87	9.51	19.90	5.75	4.01	6.38
Himalayan	28.86	5.45	29.87	6.52	19.68	2.73	6.45	8.97
Hills and Plateau	21.85	5.39	23.67	8.45	19.89	4.80	8.91	9.34
West Plain	3.83	2.74	5.51	4.66	3.34	2.49	2.81	5.99

S-O-U R C E : Calculations based on data from Census of India 1951, Vol.II, U.P. Part I-B-Subsidiary Tables, pp. 78-85.

division (to which the Upper Doab belongs) was the lowest in the State in all the four principal means of agricultural livelihood. The contrast in the proportion was very sharp. In the West Plain division the total proportions of subsidiary occupation ranged from 5.83 per cent in class III to 10.17 per cent in class II with 6.57 and 8.80 percent in classes I and IV respectively. The corresponding State proportions ran as 18.51 per cent (class III), 25.04 per cent (class II), 18.51 and 10.66 per cent class I and IV respectively. The maximum proportions, however, were returned from Himalayan division in which percentages ran as 22.41 per cent, 36.39 per cent; 34.31 per cent and 15.42 per cent in that order. The East Plain division was a close second with 25.65 per cent, 30.38 per cent, 25.15 per cent, and 10.39 percent in the same order.

This pattern of regional distribution of secondary occupations clearly indicates the fact that in 1951 the proportion of secondary employment tended to increase greatly from west to east and from plains to the hills and plateau areas. This was mainly due to the fact that in East Plain the holdings were generally much fragmented and of small size and consequently the cultivators had to supplement their income by pursuing other auxiliary occupations which they could find easily available near at hand. In the West Plain on the other hand the holdings were relatively big whereas the proportion of the cultivators of unowned land was the lowest in the State. This in other words meant considerable prosperity among the agriculturists who, therefore, were not under economic pressure to seek or pursue secondary occupations on a large scale. Besides, as noted earlier, the female element of the dependents in the West Plain was not allowed to undertake any paid job because of social

circumstances whereas in East Plain and especially in the Himalayan and Hills divisions women were free to profess any gainful occupation either within or without the house.

The position in Upper Doab and its districts was by no means any different from what it was in the natural division to which it belonged namely West Plain. In these districts the holdings were generally bigger (the details of size of holdings are discussed in the chapter on agricultural situation) in size and the general agricultural situation ~~was not~~ most prosperous in the State. This fact is reflected in the low percentages of secondaries among the actual cultivators of land while the percentages among class III and class IV were relatively high. For instance in Saharanpur the proportion of persons having secondary means with class I as their principal occupation was 2.86 per cent while among persons with class IV as principal the proportion was 6.97 per cent. This was also the pattern in other district of the region.

Another point worth noting is that amongst the cultivators of owned land and the cultivating labourers the proportion of agricultural secondaries was higher than that of non-agricultural ones. On the contrary among the persons with class II and IV as principal occupation the proportion of non-agricultural secondaries was higher than that of the agricultural secondaries. The cause of this is obvious : The cultivators of the owned land found their profession sufficiently lucrative and, therefore, felt content in utilizing their off periods rather leisurely in pursuits allied to the cultivation. The cultivating and field labourers had not only to tend the fields but also to render services like watch and ward, care of animals and, quite often some unpaid house hold duties of the tenant or the cultivator. He, therefore, could not possibly get off agriculture and consequently could not find off time for non-agricultural occupations.

The low percentage of agricultural secondaries amongst the non-cultivating owners of land; and agricultural rent receivers was due to a number of causes. Under the new administrative system the land which was not under the actual cultivating possession was entered as a possession of the tenant and not the Zamindar at the time of 1951 census. Secondly, as a result of Zamindari Abolition Act the Zamindars felt dependence on land insecure and, therefore, began to take greater interest in non-agricultural pursuits. Thirdly, the widespread urbanization in Upper Doab districts during the last two decades of the half century made non-agricultural occupations of a variety of description easily available. In periods of relative agricultural inactivity both the non-cultivating owners of land and the cultivators of unowned land were attracted to industries or pursuits of trade and transport and the like. And fourthly, the percentage of agricultural secondaries was also reduced by the fact that the Zamindars themselves parted with the sir and khud kasht in the years immediately preceding the 1951 census for fear of possible implications they might get involved into on account of the impending Zamindari Abolition Act at that time.

6. SECONDARY MEANS BY PRINCIPAL CLASS OF LIVELIHOOD

Table CXVI gives combined percentages of self-supporting persons and earning depends who had a secondary occupation for each of the four agricultural classes separately. In order to get a more detailed picture of the occupational structure the percentages of these two sub-classes (i.e., self-supporting persons and earning dependents) should be examined separately. To make the analysis facile each principal class is treated individually in the following paragraphs.

I- class I (Cultivators of Land Wholly or Mainly Owned)

a) Self-Supporting Persons

Of the self-supporting persons with class I as principal means of livelihood, as few as 4.6 per cent did only return a secondary means of livelihood. This extremely low percentage stood in sharp contrast with the corresponding proportions for the West Plain region and the State as a whole which were returned as 9.9. and 15.5 per cent respectively. Of these 4.6 per cent who returned a secondary occupation in Upper Doab 3.70 per cent had a non-agricultural secondary whereas only 0.94 per cent reported an agricultural secondary. To emphasize regional variations in the State these percentages for the major natural divisions and Upper Doab are tabulated in table CXVII. It will be noted from the table that the frequency of secondary occupations among self-supporters was highest in the East Plain and lowest in the West Plain while in Upper Doab it was less than half of the lowest in a division namely 9.9. On the other hand the percentage of non-agricultural secondaries was the second highest in Upper Doab being 79.7. This was surpassed only by the Himalayan division which had the percentage as high as 97.0. The Upper Doab percentage was, however, higher than the percentage in the home division of West Plain by almost 6.0 per cent. The proportion of agricultural secondaries in these two divisions, on the contrary, was among the lowest in the State. The circumstances which caused this great disparity between agricultural and non-agricultural secondaries were, however, not the same in the two divisions namely West Plain and the Himalayan.

In the West Plain and especially in Upper Doab districts owing to the large proportion of big holdings and efficient and wide spread irrigation facilities (Fig. 5) the cultivators were so prosperous that they in fact did not need take up either agricultural labour or others' land on sub-lease

TABLE CXVII

PERCENTAL DISTRIBUTION OF SELF-SUPPORTING PERSONS OF AGRICULTURAL LIVELIHOOD CLASS I ACCORDING TO THE NATURE OF THEIR SECONDARY MEANS OF LIVELIHOOD IN UPPER DOAB AND THE NATURAL DIVISIONS OF U.P., 1951.

Region	Persons with no secondary means of livelihood	Agricultural secondary means of livelihood		Non-agricultural secondary means of livelihood	
		% to the total self-supporting persons	% to the total who returned a secondary.	% to the total self-supporting persons	% to the total who returned a secondary
1	2	3	4	5	6
Upper Doab	95.4	0.9	20.3	3.7	79.7
West Plain	90.1	2.6	26.3	7.3	73.7
Himalayan	83.4	0.5	3.0	16.1	97.0
Central Plain	83.4	4.5	27.1	12.1	72.9
Hills & Plateau	81.6	5.0	27.2	13.4	72.8
East Plain	79.7	6.3	31.0	14.0	69.0
U.P.	84.5	4.2	27.0	11.3	73.0

S O U R C E : Calculations based on data from Census of India 1951, Vol.II, U.P. Part I-B-Subsidiary Tables pp.78-79.

for a secondary. A high percentage of non-agricultural secondaries was caused by greater opportunities made available by large scale growth and dispersion of urban centres in Upper Doab. Moreover the very insignificant percentage of self-supporting persons pursuing agricultural secondary also indicated a high agricultural efficiency in the region.[14]

In the districts severally the position was not much different from that of Upper Doab taken as a whole. Relevant percentages for each district are tabulated in table CXVIII. It may be seen that the percentage of persons taking a secondary ranged between 3.11 in Saharanpur and 7.55 in Bulandshahr. In all the districts except Bulandshahr the percentage of those who returned an agricultural secondary was less than one per cent of the self-supporters. The major part of the percentages was accounted for by the non-agricultural secondaries amongst which production other than cultivation and other services had the highest proportion.

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14. In the Himalayan division, on the other hand, owing to generally small holdings there was no possibility or need of giving land on sub-lease to others or to employ others as farm labours and thus the scope for the pursuit of agricultural secondaries was extremely limited. Besides, in this division forests and tourist centres provided a wide scope of a variety of non-agricultural secondary occupations and hence the non-agricultural secondaries accounted for as much as 97.0 per cent of the total number of persons taking up a secondary occupation.

TABLE CXVIII

PERCENTAL DISTRIBUTION OF SELF-SUPPORTING PERSONS OF AGRICULTURAL LIVELIHOOD CLASS I ACCORDING TO THE NATURE OF THEIR SECONDARY MEANS OF LIVELIHOOD BY DISTRICTS, 1951

District	No secondary means of livelihood	Total secondary means of livelihood	Agricultural secondary			Non-agricultural seconda		
			Total	Rent on agric-ultural	Cultiva-ting labour-ers	Total	Other servi-ces and miscella-neous sources	Production other than cultivatio
1	2	3	4	5	6	7	8	9
Saharanpur	96.89	3.11	0.76	0.38	0.28	2.35	0.79	1.05
Muzaffarnagar	96.68	3.32	0.78	0.39	0.32	2.54	0.68	1.18
Meerut	95.29	4.71	0.88	0.51	0.06	3.83	1.12	1.29
Bulandshahr	93.63	6.37	1.33	0.58	0.45	5.04	2.89	1.72
Upper Doab	95.61	4.39	0.94	0.47	0.29	3.92	1.47	1.31
U.P.	84.47	15.53	4.26	2.19	1.21	11.27	4.85	4.40

S O U R C E : Calculations based on data from Census of India 1951, Vol.II, U.P., Part I-B- Subsidiary Tables, pp. 78-79.

Interdistrict variation in the proportion of self-supporters pursuing a secondary was noteworthy for a gradual rise in the indices from north to south. The variation being small does not call for special attention for explanation but it may be pointed out that it was perfectly reciprocal to the variation in the proportion of the size of holdings. For instance holdings of over 25 acres gradually decreased from north to south. The highest proportion of 19 per mile was in Saharanpur, Muzaffarnagar followed with 18 per mile, whereas Meerut and Bulandshahr respectively

held third and fourth place with 8 and 7 per mille. It may, therefore be appreciated that larger holdings had the effect of minimizing the need for secondary occupations.

b) Earning Dependents

In Upper Doab as in other parts of the State the means of livelihood of the earning dependents were not divided into primary and secondary; they were, in stead, all classed as secondary occupations. The district-wise percentages of agricultural and non-agricultural secondaries are tabulated in table CXIX from which it will be seen that the agricultural secondaries accounted for overwhelmingly high proportions. The non-agricultural secondaries were consequently insignificant.

TABLE CXIX

PERCENTAL DISTRIBUTION OF EARNING DEPENDENTS OF AGRICULTURAL LIVELIHOOD CLASS I ACCORDING TO THE NATURE OF THEIR SECONDARY MEANS OF LIVELIHOOD BY DISTRICTS, 1951

District	Agricultural secondary			Non-agricultural secondary		
	Total	Cultivation of owned land	Cultivating labourers	Total	Production other than cultivation	Other services and miscellaneous sources.
1	2	3	4	5	6	7
Saharanpur	87.77	80.32	5.32	12.23	7.44	3.72
Muzaffarnagar	92.90	88.35	3.39	7.10	3.98	1.42
Meerut	94.92	93.64	0.42	5.08	2.33	1.02
Bulandshahr	92.72	91.86	0.64	7.28	3.65	3.63
Upper Doab	92.83	90.01	1.96	7.17	3.72	2.36
U.P.	92.36	87.61	3.90	7.64	2.90	3.89

SOURCE: Calculations based on data from Census of India 1951, Vol.II, U.P., Part I-B-subsidiary Tables, pp.78-79.

Among the agricultural secondaries the highest percentage was of those who were engaged in the family occupation itself namely cultivation of owned land. Among the earning dependents, too, the district-wise distribution of agricultural secondaries appeared to have some relation with the size of holdings as the lowest proportion was returned by Saharanpur and the highest by Meerut.

II - Cultivators of Land Wholly or Mainly Unowned: and their Dependents

a) Self-Supporting Persons

The proportion of self-supporting persons of this class pursuing a secondary occupation was higher than what it was among the self-supporters of class I. In Upper Doab as a whole the proportion was 8.53 per cent of the self-supporters compared with 4.64 per cent among the self-supporting persons of class I. This relatively high indulgence in secondary occupations may be attributed to the comparatively inferior economic position of the cultivators of land wholly or mainly unowned. However, the proportion of 8.53 per cent in Upper Doab was substantially below the State average of about 26.6 per cent. The explanation of this disparity is again to be sought in the more favourable economic conditions which prevailed in Upper Doab and the West Plain region. On the other hand the State proportion was much augmented by high indices of dependence on secondaries returned by East Plain and Central Plain regions which were 32.1 and 28.3 per cent respectively.

* * *

The abnormally high dependence on secondaries in these two divisions was due to heavy pressure on land and to small size of holdings. In East

and Central Plain divisions the number of persons seeking land on sub-lease was consequently high whereas the land available for such lease was very limited The self-supporting persons among the cultivators of land wholly or mainly unowned, therefore, could not generally get enough land on sub-lease to earn their livelihood and thus more often than not were compelled to take up secondar pursuits. The conditions in the West Plain division and especially in Upper Doab region were very much different. Neither the pressure on land was as heavy nor the fragmentation of holdings as acute. Due to this contrast in the agricultural prosperity the self-supporting persons of class II were not pressed to pursue secondary occupations to the same extent in the West Plain division in general and the Upper Doab region in particular.

* * *

The percentage of self-supporting persons with no secondary and with agricultural and non-agricultural secondary means of livelihood by districts are set out in table CXX. On the whole the non-agricultural secondary means of livelihood accounted for much higher percentage than was accounted for by agricultural secondaries. It will further be noted from the table that among the agricultural secondaries the cultivation of owned land accounted for more than half of the total of agricultural classes in the three districts of Muzaffarnagar, Meerut and Bulandshahr. It was only in Saharanpur that the proportion of those who pursued cultivation of owned land as secondary was surpassed by the percentage of cultivating labourers. In Upper Doab as a whole, too, *cultivation of owned land as secondary occupation accounted for more than* half of the total of agricultural secondaries. This trend stood in sharp

TABLE CXX

PERCENTILE DISTRIBUTION OF SELF-SUPPORTING PERSONS OF AGRICULTURAL LIVELIHOOD CLASS II ACCORDING TO THE NATURE OF THEIR SECONDARY MEANS OF LIVELIHOOD BY DISTRICT, 1951

District	No sec. means of live-lihood.	Total secondary means of liveli-hood.	Agricultural secondary			Non-agricultural secondary		
			Total	Cultiva-tion of owned land.	Culti-vating labourer	Total	Other servi ces	Produ tion other than culti -tion
1	2	3	4	5	6	7	8	9
Saharanpur	94.50	5.50	1.73	0.65	1.05	3.77	1.14	1.83
Muzaffarnagar	94.79	5.21	1.76	0.90	0.80	3.45	1.19	1.47
Meerut	95.57	4.49	1.29	0.86	0.33	3.14	3.31	2.35
Bulandshahr	86.00	14.00	5.20	3.62	1.52	8.80	4.55	2.32
Upper Doab	91.47	8.53	2.56	1.56	0.93	5.97	2.61	2.01
U.P.	73.4	26.6	9.46	2.63	6.73	17.14	8.67	6.18

S O U R C E : Calculations based on data from Census of India 1951, Vol.II, U.P., Part I-B-Subsidiary Tables, p.80-81.

contrast with the position in the State and its other natural divisions in all of which cultivating labourers were in excess of the cultivators of owned land. For instance in East Plain the percentage of cultivating labourers (9.06) was more than seven per cent higher than the proportion of cultivators of owned land; and a similar situation existed in the Central Plain division where the respective proportions were 7.63 and 2.22 per cent. This leads to another point that on the whole (i.e., self-supporters with and without a secondary) the proportion of persons of class II having some land of their own was relatively high in the West Plain division than in other parts of the State. This was yet another factor which lessened the pressure on the persons to seek a secondary means of livelihood and thus, partially explains very low percentages of secondaries in class II in the West Plain region and Upper Doab and its districts.

Among the non-agricultural secondaries, class VIII (other services and miscellaneous sources) and class V (production other than cultivation) had the highest shares. Relatively speaking class VIII had a slight edge over class V. This pattern was in general conformity with that found in other parts of the State. There were a few exceptions to this general trend but they were only minor. For instance in Muzaffarnagar the share of class V exceeded that of class VIII by a small margin of 0.26 per cent and in Saharanpur by 0.69 per cent. Incidentally, it appears that the proportion of class VIII increased southward inversely with the variation in the proportion of large holdings.

b) Earning Dependents

Like class I the earning dependents of class II, also, were engaged mainly in the agricultural secondaries. But comparatively the non-agricultural secondaries accounted for a fairly substantial percentage of such dependents. From the district-wise percentages given in table CXXI it will be seen that the proportion of non-agricultural secondaries ranged from 15.8 per cent in Muzaffarnagar to 24.18 per cent in Bulandshahr giving 21.07 per cent for Upper Doab as a whole. High proportions of non-agricultural secondary occupations in this case compared with those of class I may be attributed to the combined effect of relatively weak economic position of the cultivators of unowned lands and growing scope of non-agricultural occupations in the area.

TABLE CXXI

PERCENTAL DISTRIBUTION OF EARNING DEPENDENTS OF AGRICULTURAL LIVELIHOOD CLASS II ACCORDING TO THE NATURE OF THEIR SECONDARY MEANS OF LIVELIHOOD BY DISTRICTS, 1951

District	Agricultural secondary			Non-agricultural secondary		
	Total	I Cultivation of owned land	II Cultivation of unowned land	Total	V Production other than cultivation	VIII Other services & miscellaneous sources
1	2	3	4	5	6	7
Saharanpur	76.64	8.88	50.32	23.36	13.15	7.56
Muzaffarnagar	84.16	22.27	56.19	15.84	6.93	6.43
Meerut	79.02	16.73	56.41	20.98	9.32	7.62
Bulandshahr	75.82	16.55	56.29	24.18	8.39	13.46
Upper Doab	78.93	16.60	55.48	21.07	9.18	9.00

S O U R C E : Calculations based on data from Census of India 1951, Vol.II, U.P., Part I-B-Subsidiary Tables, pp.80-81.

In all the districts, and therefore, in the whole of Upper Doab, the family occupation of cultivation of unowned land was the most favoured secondary means of livelihood invariably accounting for more than fifty per cent of the total number of earning dependents. Cultivation of owned land was the next most pursued occupation in all the districts except Saharanpur where employment as cultivating labourers occupied the second place of importance. On the whole the cultivation of owned land as secondary was returned by more than sixteen per cent while the highest percentage of 22.27 was reported for Muzaffarnagar district. Amongst the non-agricultural occupations production other than cultivation (class V) and other services etc. (Class VIII) were the most popular having almost equal share of percentage in Upper Doab as a whole and combinedly accounted for more than 18 per cent against the 20 per cent of the total non-agricultural secondaries. Amongst the districts there was however much variation and disparity in the proportions of the two non-agricul-tural classes: the proportion of class V was high in industrially advanced districts of Saharanpur and Meerut whereas in industrially less developed districts of Muzaffarnagar and Bulandshahr the proportion of class V was almost equal to and appreciably less than that of class VIII respectively.

III- Cultivating labourers; and their Dependents

a) Self-Supporting Persons

The proportion of self-supporting persons with a secondary was second highest and of the non-earning dependents the second lowest in this class of agricultural means of livelihood. This was but natural because of the low economic status of the labourer or the farm worker. The proportion of the self-supporting persons who returned a secondary though was not much

different
~~difficult~~ from the first two classes it was, however, a bit higher than what ~~that~~ it was in either class I or class II. From table CXXII it will be seen that in Upper Doab about 5.84 per cent of the self-supporters reported a secondary whereas 94.26 per cent did not return any secondary means of livelihood at all. This was in sharp contrast with the position in the State wherein on the whole about 11.5 per cent reported a secondary and 88.5 per cent had none. The contrast was still sharp relative to corresponding proportions in East Plain division where the percentages ran as 16.4 and 83.6 in that order. However, the proportions in Upper Doab were closely comparable with the home division namely West Plain which recorded the respective proportions of 6.8 and 93.2 per cent. Very high proportions of self-supporting persons with a secondary in East and Central plain division were probably due to the large proportion of small holdings so that the holders often had to supplement the cultivation by taking up agricultural labour themselves which quite often earned them comparatively good income and according to the census scheme they were therefore, entered under class III instead of class I which consequently was recorded as a secondary for such persons. This situation did not prevail in the West Plain and Upper Doab with the same acuteness and hence these two regions had the lowest proportions of self-supporters with a secondary in the State.

TABLE CXXII

PERCENTAL DISTRIBUTION OF SELF-SUPPORTING PERSONS OF AGRICULTURAL LIVELIHOOD CLASS III ACCORDING TO THE NATURE OF THEIR SECONDARY MEANS OF LIVELIHOOD BY DISTRICTS, 1951

District	No secondary means of livelihood	Total secondary means of livelihood	Agricultural secondary			Non-agricultural secondary		
			Total	Class I cultivation of owned land	Class II cultivation of unowned land	Total	Class V production other than cultivation	class VI other services etc.
1	2	3	4	5	6	7	8	9
Saharanpur	97.75	2.25	0.34	0.22	0.06	1.91	1.26	0.42
Muzaffarnagar	98.01	1.99	0.45	0.32	0.03	1.54	0.96	0.41
Meerut	88.71	11.29	6.52	2.66	3.63	4.77	2.42	1.18
Bulandshahr	91.78	8.22	3.17	2.70	0.25	5.05	1.75	2.53
Upper Doab	94.16	5.84	2.52	1.46	0.90	3.32	1.58	1.16
U.P.	88. 5	11. 5	6. 9	4. 2	2. 4	4. 6	1. 8	2. 3

S O U R C E : Calculations based on data from Census of India 1951, Vol.II, U.P., Part I-B Subsidiary Tables, pp.82-83.

As indicated by the table there was considerable variation among the districts. The districts with high proportion of large holdings namely Saharanpur and Muzaffarnagar returned very low percentages of 2.25 and 1.99 respectively whereas the districts with a relatively low proportion of large holdings namely Meerut and Bulandshahr had substantially high proportions of 11.29 per cent and 8.22 per cent respectively of the self-supporting persons who offered a secondary. Incidentally, the proportion in Meerut was almost on par with the State average of 1.5 per cent. This trend of regional variation was clearly indicative of a

close relationship between the pursuit of secondaries by self-supporters and the size of agricultural holdings.

The percentages, as given in table CXXII, indicate that the non-agricultural secondaries accounted for a comparatively high proportion against the agricultural ones. This was true of the whole of Upper Doab and three of its districts. Meerut was the only exception. It seems rather paradoxical that a district like Meerut which stood very high in urban industrial development should have returned a higher percentage of agricultural secondary occupations than the non-agricultural ones. There appears to be no plausible explanation of this anomaly and deviation from the general trend in the Upper Doab region. The proportion of agricultural secondaries in Meerut was greatly augmented by abnormally high percentage of 3.63 for cultivation of unowned land. This, too, was quite surprising as the proportion of non-cultivating owners of land and the agricultural rent receivers in Meerut was among the lowest in the region. It is obviously the section of non-cultivating owners of land and the agricultural rent receiver which was the main source of land available for lease or tenancy and in the event of this section of agriculturists being of a low proportion the abnormally high proportion of 3.63 per cent is almost inexplicable.

Among the agricultural secondaries the cultivation of owned land was the commonest in the region with the lonely exception of Meerut. The labourers generally possessed very tiny plots of which they were the self cultivators but the income from such holdings was smaller than what they earned from working as labourers and, therefore, cultivation of owned land was but only a secondary means of livelihood. This explains the high proportion of class I among the agricultural secondaries. Among the non-agricultural

secondaries production other than cultivation was, as usual, the most pursued followed closely by other services and miscellaneous sources.

b) Earning Dependents

The proportion of earning dependents among the labourers was not materially different from what it was among the cultivators of unowned land. Agriculture, as could be seen from table CXXIII, was by far the most important secondary occupation of the earning dependents. Proportion of agricultural secondaries varied from 75.71 per cent in Bulandshahr to 52.30 per cent in Meerut giving a percentage of 63.41 for Upper Doab. Among the agricultural secondaries the family occupation namely service as labourers in fields was the most common and in Upper Doab as whole had a share of 48.6 in a total of 63.41 per cent. This simply indicates that the earning dependents more often than not preferred to provide assistance to the self-supporting persons of their class. Second important agricultural secondary was the cultivation of owned land. Percentages in this class ranged from 20.53 in Bulandshahr to 6.05 in Saharanpur. This occupation related to the cultivation of the tiny plots owned by the labourers as referred to in the preceding paragraph.

The proportion of non-agricultural occupations adopted as secondary means of livelihood was the highest in this class (i.e., cultivating labourers). This shows to some extent the economic weakness of the labour class among the agriculturalists. There was always a limit to the land available for sub-lease or tenancy and the plots which the labourers owned were very small and, above all, the wages were highly inadequate and the

TABLE CXXIII

PERCENTAL DISTRIBUTION OF EARNING DEPENDENTS OF AGRICULTURAL LIVELIHOOD CLASS III ACCORDING TO THE NATURE OF THEIR SECONDARY MEANS OF LIVELIHOOD BY DISTRICTS, 1951

District	Agricultural secondary			Non-agricultural secondary		
	Total	Cultivation	Cultiva-ting labourers	Total	Production other than cultivation	Other services & misc. sources
1	2	3	4	5	6	7
Saharanpur	67.26	6.05	60.14	32.74	24.55	6.40
Muzaffarnagar	67.90	10.61	55.30	32.10	16.76	12.90
Meerut	52.30	8.51	37.16	47.70	18.51	24.60
Bulandshahr	75.71	20.53	54.97	24.29	14.12	9.27
Upper Doab	63.41	11.52	48.60	36.59	18.00	15.74

S O U R C E : Calculations are based on data from Census of India 1951, Vol.II, U.P., Part I-B-Subsidiary Tables, pp.82-83.

payments highly irregular both in time and nature and consequently this agricultural class suffered great economic strain and was thus always badly in need of subsidiary occupations. Selection of occupation was out of question under such pressing circumstances so that the non-agricultural pursuits including ordinary household services were taken up. Substantially high percentage in class V was the result of privately run tiny cottage industries producing goods prepared from indigenous raw materials. Services also accounted for a substantial percentage which on the whole was only a little over two per cent short of the proportion of class V.

IV- Non-Cultivating Owners of Land ; Agricultural Rent Receivers; and their Dependents.

a) Self-Supporting Persons

The proportion of self-supporting persons was the highest in this class of agricultural means of livelihood but that of the non-earning dependents was almost equal to that in class III and, therefore, that of the earning dependents was the least. The high percentage of self-supporting persons was due to the fact that this class consisted mainly of persons who were entered as proprietors of land in village records irrespective of their age or sex whereas in other classes the self-supporting person were almost entirely of productive age-group and consisted mainly of males. The proportio of self-supporters ranged between 31.34 per cent in Meerut and 39.91 per cent in Saharanpur while the proportion for Upper Doab worked to 35.91 per cent. This was clearly the highest percentage as the respective proportions in classes I, II, and III for the Upper Doab were 29.87, 30.19 and 33.11 per cent.

The proportion of self-supporting persons who returned a secondary means of livelihood was 16.1 percent in the region. The proportion increased gradually southward from Saharanpur, which had the minimum percentage of 10.95,

to Bulandshahr which returned the maximum of 20.86 per cent. Proportions for Muzaffarnagar and Meerut worked to 13.33 and 17.90 per cent respectively. The proportion of non-agricultural secondaries was invariably more than double that of the agricultural ones. The predominance of non-agricultural secondaries was principally due to two ~~census~~ causes. Firstly, this class, consisting chiefly of high caste and more educated persons as it did, was the most affluent of all the agricultural classes and as such had sufficient capital to start commercial and or industrial business and had adequate knowledge to run such professions efficiently. Secondly, under the lurking fear of the impending abolition of zamindari they could not solely depend upon agricultural rent and had to seek some occupation which could help them make up for the eventual loss in their income. The style of life the zamindars were accustomed to could not conform with the hard work of tillage or farm labour. This caused the members of this class to take increasing interest in non-agricultural secondaries.

Examination of table CXXIV shows that among the agricultural secondaries cultivation of owned land was by far the most common. Cultivating labourers occupied only an insignificant second place. For the high class zamindar farm labour was simply out of consideration. The only agricultural occupation that was compatible with his social status was, therefore, the cultivation of the owned land and hence the predominance of this class of livelihood in the agricultural secondaries. In addition to the zamindars the class of non-cultivating owners of land also included those tenants who used to partly sublet their holdings and partly cultivate themselves and it was mainly the members of this class of tenants who pursued farm labour as a secondary means of livelihood because for their standard of living and social status this occupation did have no measure of any serious incongruity.

TABLE CXXIV

PERCENTAL DISTRIBUTION OF SELF-SUPPORTING PERSONS OF AGRICULTURAL LIVELIHOOD CLASS IV ACCORDING TO THE NATURE OF THEIR SECONDARY MEANS OF LIVELIHOOD BY DISTRICTS, 1951

District	No secondary means of livelihood	Total secondary means of livelihood	Agricultural secondary			Non-Agricultural Secondary		
			Total	Cultivation of owned land.	Cultivating labourers.	Total	Commerce	Other services & misc sources.
1	2	3	4	5	6	7	8	9
Saharanpur	89.05	10.95	2.56	1.83	0.55	8.39	2.78	4.16
Muzaffarnagar	84.67	15.33	5.04	3.91	0.87	10.29	4.95	3.40
Meerut	82.10	17.90	3.54	1.02	2.23	14.36	3.98	6.98
Bulandshahr	79.14	20.86	5.66	5.00	0.67	15.20	3.72	8.32
Upper Doab	83.90	16.10	4.18	2.97	1.03	11.92	3.82	5.66
U.P.	92.76	7.24	2.29	1.69	0.52	4.95	1.14	2.55

S O U R C E : Calculations based on data from Census of India 1951, Vol.II, U.P., Part I-B-Subsidiary Tables, pp.84-85.

Among the non-agricultural secondaries 'other services etc.' was the most preferred occupation and on the whole accounted for almost fifty per cent of the class; commerce was a significant second with a proportion of about 33 per cent in Upper Doab as a whole. As such the services and commerce had a share of more than 80 per cent of the non-agricultural secondaries between them. The probable circumstances which have caused the predominance of these non-agricultural classes have already been referred to in the preceding paragraph. This position was not particular with Upper Doab only but it was, as the the table CXXIVshows, the normal feature of the structure of secondary occupation in the State.

b) Earning Dependents

Among the earning dependents also the non-agricultural secondaries were relatively more popular than the agricultural ones. However, table CXX indicates that the preponderance of the non-agricultural occupations was by no means as striking and great as it was among the self-supporting persons noted above. This was probably due to the fact that the earning dependents included a substantial proportion of women and children also to whom the home vocations related to agriculture were obviously more facile than the non-agricultural professions which needed greater maturity and more masculinity.

Among the agricultural secondaries, as could be noted from table CXXV, there was much variation in the proportions of various classes from district to district but on the whole cultivation of owned land was the most popular, the rent on agriculture etc. followed in the second place whereas field labour occupied the third place. Amongst them these three accounted for almos

the entire number of earning dependents who returned agricultural secondaries leaving the livelihood class II of cultivation of unowned land practically unpursued. In the non-agricultural secondaries, too, there was much the similar interdistrict variation in the proportions of various classes. Nevertheless the services etc. had, on the whole, the biggest share whereas the industrial pursuits (class V) ranked third with commerce coming in between. Transport was no better placed than the cultivation of unowned land: both of these had a maximum of only 4.0 and 2.9 per cent respectively in the district of Meerut.

TABLE CXXV

PERCENTAL DISTRIBUTION OF EARNING DEPENDENTS OF AGRICULTURAL LIVELIHOOD CLASS IV ACCORDING TO THE NATURE OF THEIR SECONDARY MEANS OF LIVELIHOOD BY DISTRICTS,1951.

	Agricultural				Non-agricultural			
District	Total	Cultivation of owned land	Cultivating labourers	Non cultivating owners of land etc.	Total	Production other than cultivation	Commerce	Other services and misc. sources
1	2	3	4	5	6	7	8	9
Saharanpur	35.11	12.60	2.30	19.84	64.89	11.41	21.75	31.68
Muzaffarnagar	55.35	33.49	11.16	7.90	44.65	5.11	25.11	13.02
Meerut	46.80	9.01	22.38	12.50	53.20	8.72	9.01	31.22
Bulandshahr	39.39	18.94	4.54	15.91	60.61	22.72	15.15	22.00
Upper Doab	44.49	16.89	11.85	13.95	55.51	10.60	1 7.00	26.01

S O U R C E : Calculations based on data from Census of India 1951, Vol.II, U.P., Part I-B-Subsidiary Tables, pp.84-85.

CHAPTER IX

SECTION II

NON-AGRICULTURAL OCCUPATION

1. G E N E R A L

Against the predominant dependence on agriculture discussed in the preceding section the relative insignificance of non-agricultural means of livelihood and especially of industrial occupations was but natural. Nevertheless in comparative terms Upper Doab was probably the best placed in the State with regard to the non-agrarian pursuits. The region in 1951 returned as high a proportion as 45 per cent of the general population engaged and dependent on non-agricultural occupations. This was against the corresponding proportions of 34 per cent in the West Plain division (the home region), 17.2 per cent in the East Plain, 21.2 per cent in Himalayan, 24.7 per cent in Hills and Plateau and 24.8 per cent in the Central Plain division and 25.8 per cent in Uttar Pradesh as a whole. These percentages are given in table CXXVI and amply show the relative significance of the non-agrarian means of livelihood in the Upper Doab region vis-a-vis the State and its major natural divisions.

It is noteworthy that a comparatively substantial proportion of rural population of Upper Doab was engaged in non-agricultural occupations. As much as 34.0 per cent of the rural population returned a non-agricultural means of livelihood. This was clearly more than double of the State average (16.1 per cent) and was 12.0 per cent higher than the corresponding percentage in the West Plain division. Among the urban people, on the other hand, the proportion of non-agricultural means of livelihood was below the State average (87.6 per cent)

by 2.5 per cent. This shows that though the non-agricultural occupations were not as highly developed in urban areas they were surely better developed in rural areas of Upper Doab compared with certain divisions of the State. The relatively low proportion of non-agriculturists in the urban population of the region was chiefly due to the fact that with the exception of a few the majority of the towns were of small size and contained a sufficiently high percentage of agricultural population (vide chap. VI Sec.II).

TABLE CXXVI
PERCENTAGE OF NON-AGRICULTURAL POPULATION TO THE GENERAL,RURAL,AND URBAN POPULATION OF UPPER DOAB AND NATURAL DIVISIONS OF U.P., 1951

Region	Gen.Population	Rural Population	Urban Population
1	2	3	4
Upper Doab	45.3	34.0	85.1
West Plain Division	34.0	22.0	86.4
East Plain "	17.2	12.1	83.2
Himalayan "	21.2	11.4	95.1
Hills & Plateau "	24.7	15.0	83.9
Central Plain "	24.8	13.9	92.2
Uttar Pradesh	25.8	16.1	87.6

S O U R C E : *Calculations based on data from Census of India 1951: District* Census Handbooks, pp.vii-viii; Vol.II, U.P. Part I-B-Subsidiary Tables pp.100-101; and Vol. II, U.P., Part I-A-Report,p. 276.

There was considerable variation in the proportion of general, rural , and urban population depending on non-agricultural means of livelihood among

the districts of Upper Doab. The district-wise distribution of non-agricultura occupations with rural, urban break up is set out in table CXXVII. It is eviden from the table that the districts of the Upper Doab were distinctly grouped into two classes of more than half and less than 40 per cent of the general population engaged in non-agricultural occupations. To class one belonged the districts of Saharanpur and Meerut each returning a non-agricultural ratio of about 52.2 per cent of the general population. Bulandshahr and Muzaffarnaga belonged to the second with the corresponding ratios of 36.9 and 34.9 per cent respectively. The reason of this interdistrict variation was the existence of big urban centres in Saharanpur and Meerut in the one case and the absence of such centres in Bulandshahr and Muzaffarnagar in the other. Besides the big cities of Saharanpur and Meerut, these districts also had a good many medium size towns and thus the development of urban occupations was fairly highly diffused over the districts. These districts by virtue of this diffusio also had the highest rural proportions pursuing non-agricultural occupations which worked to 42.1 per cent in Meerut and 39.3 per cent in Saharanpur. Similarly these districts also returned the highest non-agricultural ratio in the urban population in the region. For opposite reasons the corresponding ratios in Muzaffarnagar and Bulandshahr districts were relatively much less.

2. VARIATION SINCE 1901

The notable feature of the variation is that the non-agricultural occupations have suffered a sustained, if not a steady, decline during the fifty years from 1901 to 1951. In 1901 the proportions of agricultural and non-agricultural occupations (including the dependents) were almost

equal being 48.1 and 51.9 per cent respectively. Thenceforth the proportion of non-agricultural means of livelihood began to decline and by 1921 reduced to 44.7 per cent of the general population. In 1931 the position was almost unchanged as the proportion of this class of occupation in Upper Doab was returned as about 43.6 per cent. It was only after 1931 that the non-agricultural occupations began to recover from earlier losses and by 1951 their proportion increased to about 45.3 per cent. It is therefore evident that despite the effects of rapid urbanization and industrial developments during the thirties and forties the proportion was still short of the 1901 percentage by as much as 6.6 per cent. The intercensal variations for selected periods in Upper Doab and its districts are given in table CXXVIII. The table shows that the decline was universal in Upper Doab and followed a fairly uniform pattern in all the districts of the region.

The decline in non-agricultural means of livelihood was a reflex of increase in agricultural occupation. As pointed out in the preceding chapter a substantial rise in the price of agricultural produce between 1914 and 1921 made the cultivators fairly prosperous and the industrial wages became less attractive so that according to Turner the industrial wages not only failed to attract the cultivator from his fields but his prosperity placed him in a position to employ labour to assist him.[1] It has also been noted earlier that the spread of epidemics especially that of influenza reduced

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1. Turner, A.C., Census of India, 1931, U.P. of Agra and Oudh, Vol.XVIII Part I-A-Report, pp.382-384.

the man power available for cultivation to such an extent that a large number of persons who had migrated to urban areas had to go back to their villages and do the cultivation of land themselves.

TABLE CXXVII
PERCENTAGE OF NONAGRICULTURAL POPULATION TO THE GENERAL, RURAL & URBAN POPULATION IN THE U. DOAB BY DISTRICTS 1951

District	General Population	Rural Population	Urban Population
1	2	3	4
Saharanpur	52.2	39.3	91.0
Muzaffarnagar	34.9	25.4	81.8
Meerut	52.2	42.1	88.4
Bulandshahr	36.9	29.0	79.3
U.G.Y. Doab	45.2	34.0	85.1

S O U R C E : Calculations based on data from Census of India, 1951, Vol.II, U.P. Part I-B-Subsidiary Tables p.100 and the Census Handbooks of the districts. 1951, pp. vii - viii.

TABLE CXXVIII
VARIATION IN THE PROPORTION OF NON-AGRICULTURAL OCCUPATIONS BY DISTRICTS, FROM 1901 to 1951

District	Census Year			
	1901	1921	1931	1951
1	2	3	4	5
Saharanpur	53.0	47.1	44.1	52.1
Muzaffarnagar	48.6	44.7	43.5	34.9
Meerut	49.6	42.7	43.4	52.3
Bulandshahr	48.0	35.7	34.6	36.9
Upper Doab	49.6	42.5	41.4	45.2

S O U R C E: Calculations are based on data from census of India, U.P. 1901, 1921, 1931 and 1951.

The cultivation proved more lucrative due to high agricultural prices and therefore they were not willing to return to a less profitable non-agricul--tural pursuit and run the risk of being away from their village lands. Such were the circumstances which cused the non-agricultural occupations to decline till late twenties of the century.

But during the closing years of the third decade floods and pest epidemics shattered the level of agricultural prices and a consequent reversal of movement was brought about. Both the agricultural labourers and the small tenants began to move from the villages to the urban centres. As has been noted earlier the townward movement continued in a rather irregular fashion during the thirties till under the war conditions new industrial establishments, both big and small, rapidly came up and the demand for labour and rates of wages in the non-agricultural occupations increased. Agriculture thus, went on losing to industry, commerce and services with a somewhat augmented pace during the war years so that by 1951 the proportion of non-agricultural means of livelihood came nearest to the 1901 level.

3. REGIONAL DISTRIBUTION 1951

Tahsil-wise distribution of the four major non-agricultural occupations for 1951 is set out in tables CXXIX , CXXX , CXXXI, and CXXXII. A close examination of the percentages given in these tables reveals that the proportion of industrial means of livelihood (production other than cultivation) was in general relatively high in tahsils bordering on khadir tracts of either the Ganga or the Yamuna. Production other than cultivation was the most professed means of livelihood among the non-agricultural occupations in the tahsils of Jansath

TABLE CXXIX

TAHSIL-WISE PERCENTAL DISTRIBUTION OF GENERAL,RURAL, AND URBAN POPULATION BY VARIOUS CLASSES OF NON-AGRICULTURAL MEANS OF LIVELIHOOD IN THE DISTRICT OF SAHARANPUR, 1951

Tahsil	Population total Rural Urban	Production other than cultivation	Commerce	Transport	Other services and miscella--neous sources	Total
1	2	3	4	5	6	7
Deoband	T	12.4	5.5	0.9	29.4	48.2
	R	10.7	2.4	0.4	28.7	42.2
	U	22.1	21.0	3.0	33.8	79.9
Nakur	T	13.3	6.9	1.1	10.8	32.1
	R	10.8	3.4	0.5	8.6	23.3
	U	25.5	24.1	3.5	21.7	74.8
Roorkee	T	15.1	8.6	2.2	28.7	54.6
	R	13.2	4.3	1.2	20.2	39.9
	U	20.6	20.9	4.8	47.5	93.8
Saharanpur	T	17.3	11.3	4.2	29.4	62.2
	R	13.1	3.7	0.6	27.4	44.8
	U	25.4	23.9	11.1	33.3	93.7
	T	15.0	8.6	2.4	26.1	52.1
DISTRICT	R	12.2	3.6	0.7	22.6	39.1
	U	23.5	23.6	7.3	36.5	90.9

S O U R C E : Calculations based on data from Census of India 1951, Vol.II, U.P., Part II-A General Population Tables pp.114-120.

TABLE CXXX

TAHSIL-WISE PERCENTAL DISTRIBUTION OF GENERAL, RURAL, AND URBAN POPULATION BY VARIOUS CLASSES OF NON-AGRICULTURAL MEANS OF LIVELIHOOD IN THE DISTRICT OF MUZAFFARNAGAR, 1951.

Tahsil	Population total Rural Urban	Production other than cultivation	Commerce	Transport	Other services & miscellaneous sources	Total
1	2	3	4	5	6	7
Budhana	T	14.3	6.3	0.9	11.7	33.2
	R	13.8	5.1	0.8	8.5	28.2
	U	18.6	8.9	1.9	47.4	76.8
Jansath	T	12.5	5.7	1.0	9.7	28.9
	R	11.2	3.4	0.7	6.7	22.0
	U	23.3	24.2	3.4	34.3	85.2
Kairana	T	15.9	7.5	1.5	12.3	37.2
	R	13.9	4.0	0.6	8.1	26.6
	U	24.0	21.6	2.6	29.5	77.7
Muzaffarna-gar	T	13.7	8.9	2.2	13.9	38.7
	R	12.7	3.5	1.1	7.5	24.8
	U	17.2	28.3	6.3	36.5	88.3
District	T	14.1	7.3	1.4	12.1	34.9
	R	12.9	4.0	0.8	7.7	25.4
	U	20.4	23.6	4.0	33.3	81.3

S O U R C E : Calculations based on data from Census of India 1951, U.P. op.cit.

TABLE CXXXI

TAHSIL-WISE PERCENTAL DISTRIBUTION OF GENERAL, RURAL, AND URBAN POPULATION BY VARIOUS CLASSES OF NON-AGRICULTURAL MEANS OF LIVELIHOOD IN THE DISTRICT OF MEERUT, 1951.

Tahsil	Population Total Rural Urban	Production other than cultivation	Commerce	Transport	Other services & miscellaneous sources	Total
1	2	3	4	5	6	7
Baghpat	T	14.0	6.8	1.0	24.5	46.3
	R	13.5	4.5	0.7	26.6	45.3
	U	17.3	23.1	3.1	28.7	72.2
Ghaziabad	T	20.5	8.4	3.5	21.4	53.8
	R	18.1	4.6	1.2	19.7	43.6
	U	30.4	23.9	11.7	26.2	92.2
Napur	T	14.9	7.7	2.5	29.0	54.1
	R	13.8	3.6	0.9	22.6	40.9
	U	19.8	28.2	7.8	29.1	84.9
Mawana	T	12.9	5.4	0.9	21.8	41.0
	R	12.6	3.6	0.6	21.0	37.8
	U	19.6	18.4	4.2	27.6	69.8
Meerut	T	18.6	13.1	3.7	35.9	71.3
	R	16.8	4.9	1.1	24.0	46.8
	U	20.3	21.0	6.3	47.6	95.2
Sardhana	T	18.7	5.8	1.2	17.0	42.7
	R	17.7	4.9	1.1	16.2	39.9
	U	30.0	16.3	2.6	26.4	75.3
District	T	16.9	8.3	2.2	24.9	52.3
	R	15.3	4.4	1.1	21.3	42.1
	U	22.0	22.2	6.6	37.4	88.2

TABLE CXXXII

TAHSIL-WISE PERCENTAL DISTRIBUTION OF GENERAL,RURAL, AND URBAN POPULATION BY VARIOUS CLASSES OF NON-AGRICULTURAL MEANS OF LIVELIHOOD IN THE DISTRICT OF BULANDSHAHR, 1951

Tahsil	Population Total Rural Urban	Production other than cultivation	Commerce	Transport	Other services and miscella--neous sources	Total
1	2	3	4	5	6	7
Anupshahr	T	10.3	5.4	0.9	12.8	29.4
	R	9.0	3.3	0.6	10.9	23.8
	U	20.2	21.0	3.7	26.9	71.8
Bulandshahr	T	13.4	6.8	1.6	19.3	41.1
	R	11.6	3.3	0.9	16.0	31.8
	U	21.2	22.6	4.7	34.2	82.7
Khurja	T	10.3	7.2	1.9	22.0	41.4
	R	7.7	3.2	1.6	20.8	33.3
	U	21.9	25.1	5.7	27.6	60.3
Sikandarabad	T	11.9	5.9	1.7	15.6	35.1
	R	9.2	2.9	0.9	14.8	27.8
	U	23.8	26.5	7.2	21.4	78.9
District	T	11.4	6.4	1.6	17.5	36.9
	R	9.5	3.2	0.8	15.4	28.9
	U	21.6	23.6	5.2	28.8	79.2

S O U R C E : Calculations based on data from Census of India 1951, U.P. op.cit.

(43.2 per cent), Budhana (43.0 per cent), Kairana (42.7 per cent), Nakur (41.4 per cent), Anupshahr (35.0 per cent), and Sikandarabad (33.9 per cent). All these tahsils are peripheral and of comparatively low level of agricultural prosperity. Khadir tracts and sandy belts abounding in these tahsils have imposed limitations on the scope of agriculture and the related occupations as means of livelihood and the people have turned to the production and processing of indigenous raw materials. Besides, these tahsils generally did not possess towns of fairly large size and the venue of employment under the category of other services was consequently not as wide open as it was in other tahsils such as Meerut or Saharanpur which had big towns within their bounds. This relative insignificance of occupation VIII in the above noted tahsils of high proportion of occupation V is clearly manifest from tables CXXIX, CXXX, CXXXI, and CXXXII.

However on the whole the livelihood class VIII of non-agricultural occupations accounted for the highest proportion inter se. Among the districts the proportions ranged between 51 and 34 per cent. Saharanpur had the highest percentage (50.9) whereas Muzaffarnagar had the lowest (34.7). Meerut and Bulandshahr each had 47.4 per cent of the non-agrarian population living on services etc. Muzaffarnagar was the only district in which the proportion of the services etc. was surpassed by that of the production other than cultivation otherwise in the remaining three districts services and the miscellaneous sources was the most predominant among the non -agricultural means of livelihood.

Commerce was the third important non-agricultural occupation. The proportions inter se were rather uniformly distributed among the districts and ranged between 15 and 21 per cent. The highest percentage (21) was recorded in

Muzaffarnagar and the lowest percentage (15.8) was returned by Meerut. Bulandshahr and Saharanpur lay in between with 17.8 and 16.5 per cent respectively. The highest percentage of commerce in Muzaffarnagar was probably a concomitant of the predominance of the industrial means of livelihood. But the commerce was mainly of local character. This may be inferred from the lowest proportion of dependents on transport as means of livelihood. In fact this occupation was the most insignificant of all the non-agricultural means of livelihood in all the districts. The lowest proportion recorded in Muzaffarnagar was 4.0 per cent and it did not differ much from corresponding proportions in the other districts which were 4.3 per cent in Bulandshahr, 4.4 per cent in Meerut, and 4.6 per cent in Saharanpur.

In terms of total population the proportions of non-agricultural means of livelihood as given in the four tables (CXXIX to CXXXII) were generally low. Only the sadar tahsils of Meerut and Saharanpur and the tahsils of Roorkee, Hapur and Ghaziabad had the sizable proportions exceeding 50 per cent. In six of the remaining thirteen tahsils the proportion was above 40 per cent and in the seven it was well below that mark. The lowest proportions were generally recorded in the tahsils of Muzaffarnagar and Bulandshahr districts. This was a reflex of the relatively low urbanity of these districts. The influence of urban centres is evidenced by huge contrast between the rural and urban percentages and also the urban proportions inter se in various tahsils of the region. The highest urban proportions were 95.2, 93.8, 93.7, and 92.2 per cent found in the tahsils of Meerut, Roorkee, Saharanpur and Ghaziabad respectively whereas some of the highest

rural proportions were 46.8, 45.3, 44,8, 43.6, and 42.2 per cent found respectively in the tahsils of Meerut, Baghpat, Saharanpur, Ghaziabad and Roorkee. This concurrence of the urban and rural maxima further confirms the concentrated distribution of non-agricultural means of livelihood and emphasizes the need for diffusion and diversification of non-agrarian activities among the tahsil of the region.

There was not much contrast between rural and general population in respect of the proportions of various classes of non-agricultural means of livelihood. In fact the distribution between the total and rural population was relatively more uniform than contrasting. This was chiefly due to the over all high rurality of the population as there was not much difference between the rural and total population of the majority of the tahsils. The need for widely diffused development of a variety of industries was consequently very imminent especially when it is seen that services and miscellaneous sources accounted for the highest proportion among the four principal classes of non-agricultural occupations.

4. SELF - SUPPORTING PERSONS

A comparative assessment of various non-agricultural occupations may also be had by examining the proportions of self-supporting persons in the major economic divisions of these occupations which are set out in table CXXXIII. It will be seen from the table that in all the districts excep Muzaffarnagar the economic division of processing and manufacture was the second most favoured occupation after services of a miscellaneous nature.

TABLE CXXXIII

PER MILLE DISTRIBUTION OF SELF-SUPPORTING PERSONS OF NON-AGRICULTURAL OCCUPATIONS CLASSIFIED ACCORDING TO ECONOMIC DIVISIONS, 1951.

Economic division	self-supporting persons			
	Saharanpur	Muzaffarnagar	Meerut	Bulandshahr
1	2	3	4	5
0- Primary industries not elsewhere specified	46.8	55.1	36.2	28.4
1- Mining and quarrying	1.2	-	0.3	0.6
2- Processing and Manufacture-foodstuff, textiles, leather and products thereof	149.1	226.7	158.6	160.0
3- Prodessing and manufacture-metals chemicals and products thereof	24.1	36.5	39.9	19.9
4- Processing and manufacture-not elsewhere specified	76.8	104.0	99.9	98.5
Total of 2,3 and 4	240.0	367.2	298.7	279.0
5- Construction and Utilities	69.1	88.6	72.1	125.8
6- Commerce	142.7	191.6	139.0	153.5
7- Transport, storage and communications	46.4	41.9	45.5	40.3
8- Health education and public administration	80.1	60.6	94.7	48.6
9- Services not elsewhere specified	363.7	195.0	313.8	324.4

S O U R C E : Census of India, 1951, District Census Handbooks, pp.VII-VIII.

The proportion of self-supporters engaged in processing and manufacturin was highest in Muzaffarnagar although the principal large scale industries (chiefly sugar mills and confectionary) were few in number. The cottage industries which included a variety of description, therefore, accounted for a substantially high proportion of the self-supporters in the non-agricultura occupations.

In Saharanpur district the processing and manufacturing industries accounted for only 24.00 per mille of the self-supporters. The large scale industries in the district were relatively more numerous and of varied description. The principal industries among the large scale establishments were cotton ginning and pressing mills, tobacco factories, paper mills, engineering plants, distilleries and enamelling plants. The bulk of the non-agricultural population was consequently more concentrated and confined to a few urban centres such as Saharanpur, Jawalapur, Hardwar, and Roorkee The cottage industries were relatively few and not as widely despersed as they were in Muzaffarnagar district. Out of a total of 220,689 self-supporting persons who earned their livelihood from productive sources of non-agricultural classes 131,716 or 59.6 per cent were returned as rural whereas the corresponding proportion of rural population in Muzaffarnagar district calculated to about 62.9 per cent. Similarly the percentages of rural employees and employers in Saharanpur were only 35.7 and 8.0 against the corresponding percentages of 54.4 and 53.9 in Muzaffarnagar. These contrasts amply show the dominance of urban centres in the Saharanpur district in respect of the non-agricultural occupations and emphasize the need for still greater diffusion of cottage industries into rural areas so that the agriculturalists may get adequate opportunities

for secondary occupation and the pressure on the already over burdened agriculture may be eased or atleast may be guarded from becoming more intense.

On the whole the distribution of various economic divisions among the self-supporting persons in the district of Meerut and Bulandshahr was fairly comparable. This is evident from table CXXXIII. In Meerut, processing and manufacturing industries were pursued by about 298.7 per mille of the self-suppor--ters. This was well above the corresponding proportion of about 279.0 in Bulandshahr. The principal large-scale industries in the district were the sugar factories of Daurala, the glass and ceramics works of Ghaziabad, the vegetable oil mills of Modinagar and Ghaziabad, soap works and textile mills of Modinagar, the oil mills of Hapur and the strawboard mills and musical instruments works of Meerut. In addition to the large-scale industries these urban centres also had a variety of cottage industries such as leather works, handloom cloth weaving, hosiery, calico printing, woollen blankets, iron utensils, agricultural implements etc. A notable feature of the district, however, was a relatively wide distribution of industries and other non-agricultural occupations extending well into the rural areas. This is revealed by substantially high percentages of rural population in industries and allied services. Of 366,073 self-supporting persons who earned their livelihood from productive sources of non-agricultural classes, 228,738 persons or 62.8 per cent belonged to rural category. Among the employees and employers the rural percentages were about 61.6 and 41.5 respectively. In respect of diversification of occupations the district was relatively well placed in the region and this may be one of the causes of its high prosperity in both agricultural and non-agricultural sections of the population.

Bulandshahr had only a few large-scale industries among which ceramics and pottery works were the only principal ones in the district. Of the total

number of 181,531 self-supporting persons who earned their livelihood from productive sources of non-agricultural classes, as many as 127,002 persons or about 70.0 per cent were rural. This indicates that the non-agricultural occupations were fairly wide spread in the district. Due to limited number of large-scale industries, ~~this~~ the cottage industries carried the bulk of the industrial population. Of the 184,943 self-supporting persons as many as 155,139 or 85.5 per cent were returned as independent workers whereas the proportions of employees and employers were 13.4 and 1.1 per cent respectively. The percentages of rural population among the independent workers, employees and employers were 74.2, 47.0 and 18.3 in that order. The high percentage of independent workers indicates the unorganized character of industrial and other non-agricultural occupations which of course were widely diffused in the district. Even this wide dispersion of industries was not effective in redressing the disequilibrium from which the economy of the district suffered as the pressure of non-earning dependents in the non-agrarian population had increased from 17.9 per cent in 1921 to 23.4 per cent in 1951. It, therefore, seems that a judiciously organized development of cottage and other small scale agricultural industries is badly needed to restore stability in the economy and to lessen the burden on agriculture which has unfortunately been constantly increasing since 1901.

CHAPTER X

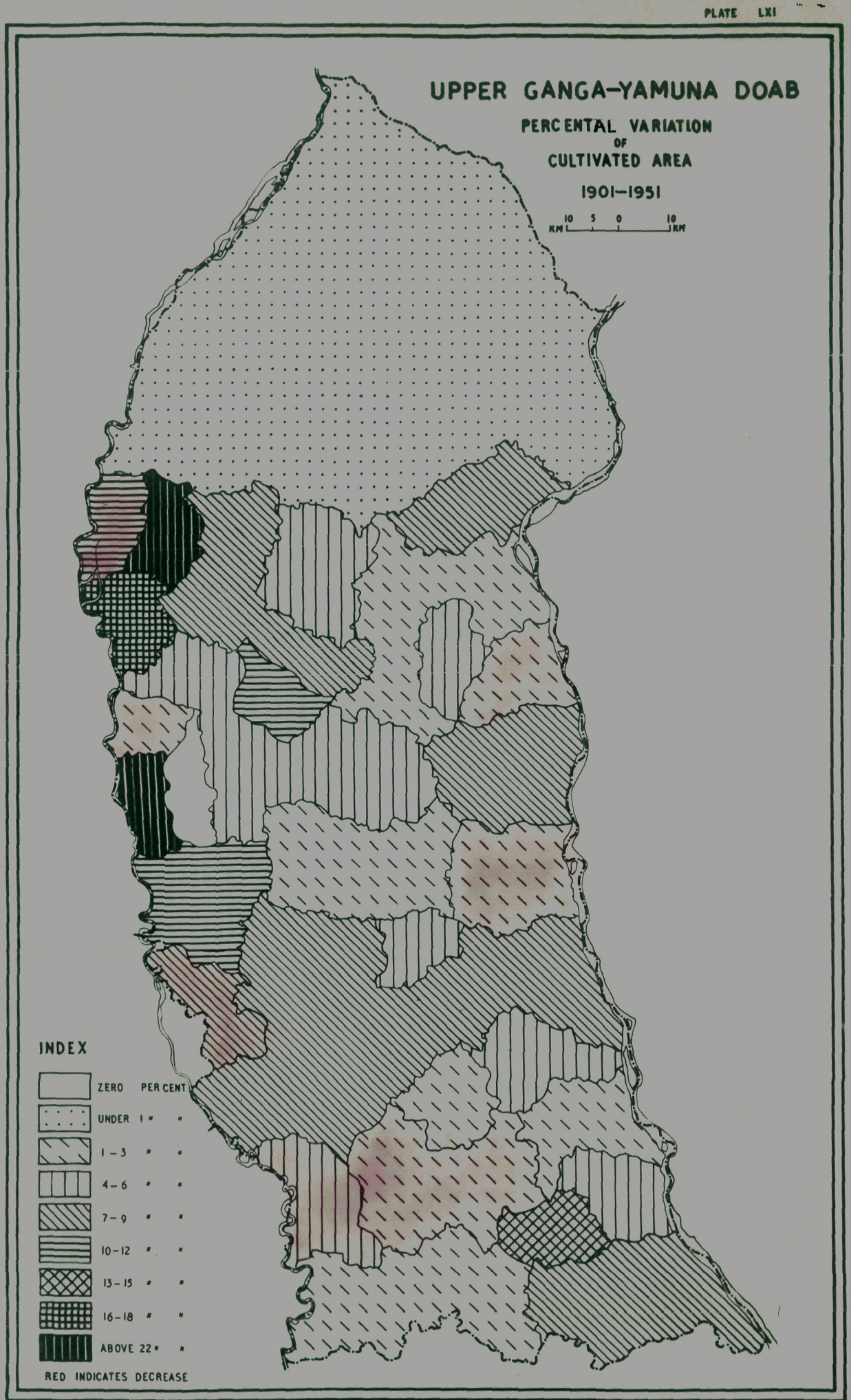
PROGRESS OF AGRICULTURE

It has been noted in the preceding chapters that agriculture was the mainstay of the majority despite the development and progress made in the non-agrarian sectors of occupation. Because of the preponderance of agricultural means of livelihood an assessment of the progress of cultivation and the production of food crops is a prerequisit for understanding the economic implications of the growth and distribution of population in Upper Doab. (Fig. 71).

1. DECLINE OF CULTIVATION PER CAPITA

It is evident from table CXXXIV that cultivation did not keep pace with the growth of population. There has been progressive decline in cultivated area per capita since 1901. The cultivated area per capita has come down from about 0.78 acres in 1901 to only about 0.58 acres in 1951. This obviously means that on the 1901 level of yield per acre and agricultural efficiency every man, woman and child was bound to get less food and other agricultural produce from land in 1951 than in 1901. This decline in the per capita share of cropped area was almost universal in the region. During the first two decades there was a decrease in population as well as cultivated area owing to influenza and plague epidemics. The fall in cultivation was, however, somewhat lesser than the reduction in population, which, as has been seen in earlier chapters, suffered heavily from the visitation of these epidemics. But during the decade of population recovery the

PLATE LXI



Source of Data : Distt. Handbooks 1951; Distt Gaz. 1903, and the Records of the Agricultural Deptt. of U.P.

FIG. 71

TABLE CXXXIV

INTERCENSAL VARIATION IN AGRICULTURAL LANDUSE AND PER CAPITA SHARE OF CULTIVATED LAND BY DISTRICTS, 1901-1951

District	Year	Not available for cultiva--tion	Uncultivated land includ--ing current fallow	Current fallow	Not area shown	Cultiv ted land per capita
1	2	3	4	5	6	7
Saharanpur	1901	145,059	413,839	37,936	881,699	0.83
	1911	144,482	172,299	48,787	861,112	0.87
	1921	153,477	204,706	62,109	810,505	0.86
	1931	160,499	171,242	46,968	836,603	0.80
	1941	162,689	144,031	31,030	843,347	0.71
	1941	162,868	140,350	48,349	868,737	0.64
Muzaffarnagar	1901	146,123	187,565	40,185	730,844	0.83
	1911	141,021	185,654	42,787	742,117	0.92
	1921	140,604	247,183	87,847	657,419	0.82
	1931	139,550	187,118	47,548	715,761	0.80
	1941	134,326	181,416	54,053	722,419	0.68
	1951	137,217	131,802	31,865	775,567	0.63
Meerut	1901	177,015	240,068	45,182	1,093,857	0.71
	1911	168,961	203,690	36,468	1,125,571	0.75
	1921	164,723	300,252	119,852	1,004,304	0.67
	1931	162,565	256,707	77,480	1,049,770	0.65
	1941	164,018	225,724	60,663	1,074,651	0.56
	1951	167,150	151,679	36,166	1,148,194	0.50
Bulandshahr	1901	124,427	193,592	24,171	894,623	0.78
	1911	127,190	190,200	27,381	902,550	0.80
	1921	137,133	296,910	118,477	785,327	0.74
	1931	137,047	225,293	46,449	859,542	0.75
	1941	135,801	196,032	32,046	885,591	0.67
	1951	150,208	145,633	31,123	926,545	0.62

S O U R C E : Calculations based on data from District Census Hamdbook 1951, pp, 198-201 (Saharanpur), 164-167 (Muzaffarnagar), 202-205 (Meerut), and 182-185 (Bulandshahr).

cultivation remained more or less stationary. From 1931 the population entered the phase of rapid growth registering an increase of about 38.2 per cent by 1951 and left the cultivation lagging much behind as the growth in gross cultivated area had been only 3.2 per cent or a little less than one-tenth of the increase in population by the year 1951.

Decline by Districts

Table CXXXIV shows that there was but little variation in the decline of cultivation per capita among the districts of Upper Doab during the fifty-year period. The reduction in per capita share was almost 25 per cent of the share in 1901.

More specifically speaking Saharanpur suffered a loss of 0.19 acres per head or about 23 per cent of the 1901 share. Similarly the reductions in Muzaffarnagar, Meerut, and Bulandshahr were 0.2 acres (or about 24 per cent), 0.21 acress (or about 30 per cent) and 0.16 acres (or about 20 per cent) respectively. These percentages of decline contrasted greatly with the corresponding reduction in the State which worked to only about 14 per cent of the 1901 figure as the cultivation per capita in U.P. went down to 0.63 acres in 1951 from 0.74 acres in 1901.

The relation between progress of cultivation and growth of population is clearly impressed by the fact that in almost all the districts there was a slight increase in the cultivation area per capita during 1901-1911 which was the decade of general decline in population. During the second decade the cultivation showed equally slight decline in all the districts. During the period of second phase of population growth the cultivated area declined

still further but it was,nevertheless, only a nominal decrease. When the population dynamism entered the third phase the decline in the cultivation per capita became notably sharp. Thus by the turn of the half century the supply unit for every man, woman, and child was about a quarter lesser than what it was at the beginning of the century.

S A H A R A N P U R

That there was no appreciable possibility of increase in the cultivated area is evidenced by the fact that in all the districts of Upper Doab the cultivation received such a great impetus from the extension of canal irrigation during the second half of the 19th century that by the turn of the century the cultivation had reached almost its furthest possibl limit. According to the first regular settlement of Saharanpur the distric had only about 606,847 acres or about 50 per cent of the total area as cultivated land.[1] But by 1901-1902 the average was as high as 881,699 acres or about 74.5 per cent of the entire district. This was amongst the few highest percentages achieved by the districts of the State. The unculturable waste in the district according to the official records of 1901 was estimated at 114,634 acres or about 9.7 per cent of the whole. This included the barren land and the old fallow. It is, therefore, evident that there was but almost no possibility left in the district for any appreciable extension in cultivated area.

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1. District Gazetteer of Saharanpur, 1903, pp.42-43.

It may be seen that during the fifty years from 1901 to 1951 the cultivated area did actually go down by 12,962 acres. This provides a further confirmation of the fact that areal extension in cultivation could not be conceived of as a possible compensation for the rapid increase in population numbers.

M U Z A F F A R N A G A R

A similar situation existed in Muzaffarnagar district. According to 1948 settlement the district had 628,863 acres or a little over 59 per cent of the total area under actual cultivation. As a result of the opening up of the Ganga (the then Ganges) Canal new lands were broken up and by 1853 the cultivated area increased to about 63 per cent or 670,468 acres. In 1891 at the time of Miller's settlement the total cultivated area amounted to 683,783 acres or about 64.4 per cent. A decade later the cultivated area in 1901 totalled 730,848 acres or about 68.7 per cent of the entire district.[2] During the first fifty years of the present century the cultivated area made a gain of 34,723 acres or about 4.7 per cent of the 1901 total. The culturable waste which included old and new fallow, groves and barren lands was estimated at about 147,380 acres or about 14 per cent of the whole district. This clearly shows that with the increase of about 35,000 acres during 1901-51 the cultivation had, by 1951 reached almost its fullest in areal expansion and no further appreciable extension could possibly be envisaged.

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2. District Gazetteer of Muzaffarnagar, 1903, pp.28-29.

M E E R U T -

Cultivation in Meerut has been very highly developed since the beginning of the 19th century. In 1836 the total cultivated area of the district was 855,879 acres or about 57 per cent of the whole. As a result of rapid extension of canal irrigation the cultivated area increase to 1,043,515 acres or about 69 per cent of the entire district in 1860.[3] The average for 1901-02 worked to 1,093,576 acres or about 72.6 per cent. During 1901-1951 the cultivated area of the district made a gain of 54,337 acres or about 4.9 per cent of the total for 1901. Thus in 1951 the total cultivated area in the district was 1,148,194 acres or about 78.3 per cent of the whole. This was definitely the highest percentage which any district in the State could boast of. In 1951 the culturable area in the district amounted to 81,609 acres or only about 5.5 per cent whereas barren lands totalled about 66,324 acres or only about 4.5 per cent. These figures show the extent to which the cultivation has been carried in the district which almost touched the point of the furthest possible limit.

B U L A N D S H A H R

Bulandshahr district was in no way different from the other three districts. In this district, too, the cultivation had gone to its almost fullest possible expansion and there was in fact no possibility of any further expansion. In this district also the phenomenal extension in

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3. District Gazetteer of Meerut, 1901, pp.35-37.

cultivation came about as a result of rapid canalization during the fifties of the 19th century. In 1848 the total cultivated area in the district amounted to 675,918 acres or about 57 per centof the whole. Within twenty-three years i.e., by 1871 the area increased to about 64 per cent of the entire district. Thirty years later in 1901 the total cultivated area amounted to 894,623 acres or about 73.6 per cent. According to Nevill this percentage could reasonably be taken as closely approximating finality.[4] This assessment is well borne out by the fact that during the first fifty years of the 20th century the cultivated area made a gain of only 31,922 acres or about 3.4 per cent of the total at 1901. In 1951 the total culturable waste in the district was 77,127 acres or only about 6.3 per cent of the district's total area. The total barren area in 1951 amounted to 80,839 acres or about 6.6 per cent of the whole.

From this outline of the land use of the district it will be seen that in the whole of the Upper Doab there was no more than academic possibility of any substantial increase in the cultivated area.

An alternative to area extension is an increase in yield both gross as well as per acre by increase in double cropped area and better irriga-tion and culture.

2. VARIATION IN DOUBLE CROPPED AREA

In respect of double cropping there has been some gain in Upper Doab but as the statistics indicate the increase was not sufficient to compensat for the lag in the overall progress of cultivation in the region.

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4. District Gazetteer of Bulandshahr 1901, pp.31-32.

Table CXXXV shows that the variation of double cropped areas by districts in Upper Doab during the fifty years from 1901 to 1951. It will be seen that the area sown more than once increased in all the districts in 1911. Thenceforth, the area declined considerably in 1921, made a partial recovery in 1931,

TABLE CXXXV

DECENNIAL VARIATION IN THE DOUBLE CROPPED AREA BY DISTRICTS, 1901 to 1951

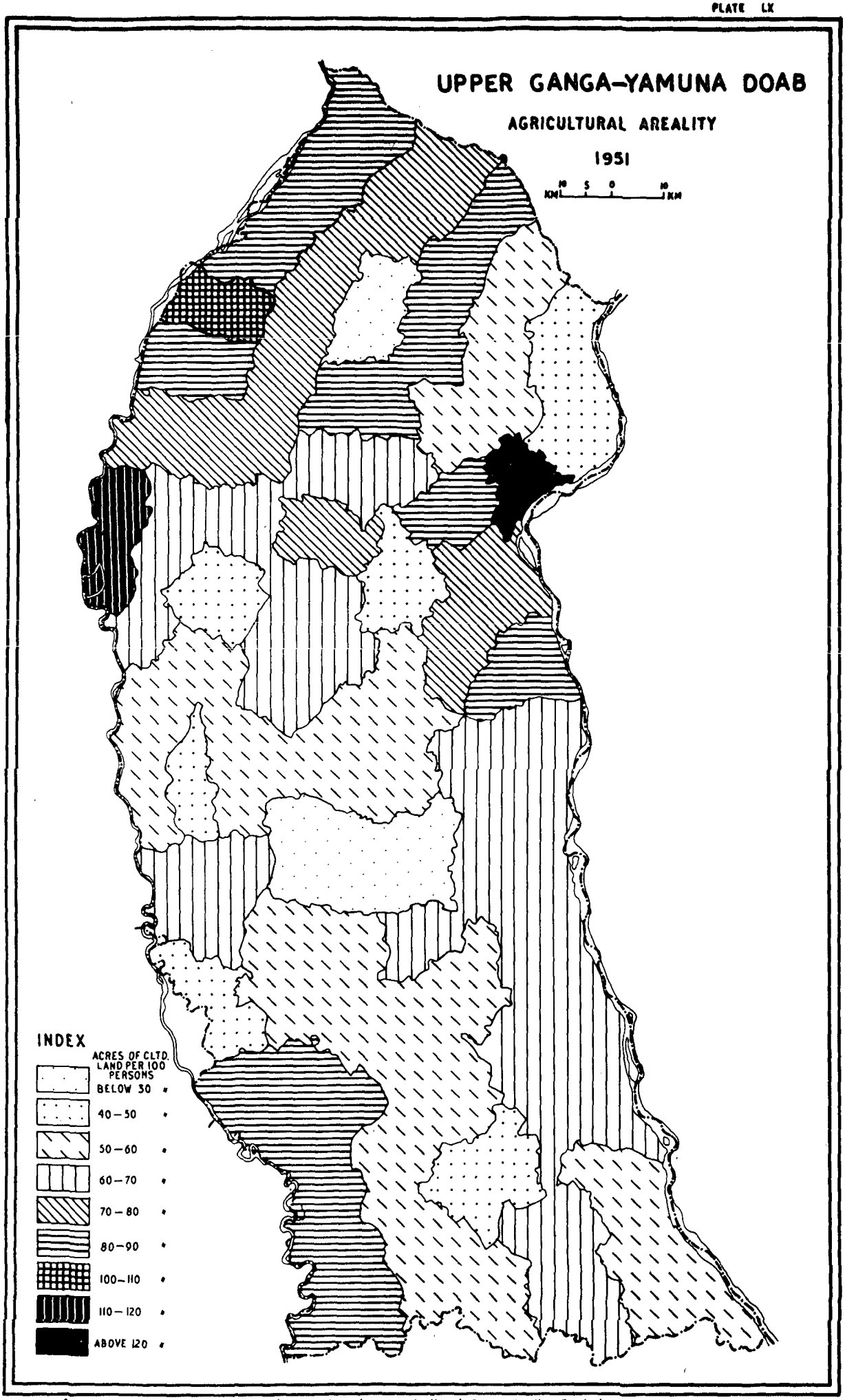
District	Double cropped area at the end of the year (in acres)					
	1901	1911	1921	1931	1941	1951
1	2	3	4	5	6	7
Saharanpur	213077	241874	154304	181719	218643	280934
Muzaffarnagar	134451	156742	98563	132900	194562	229813
Meerut	222126	297823	221087	257632	316448	408171
Bulandshahr	214936	236441	219596	243294	289711	318202
Upper Doab	784590	932880	693555	815545	979364	1237120

S O U R C E : District Census Handbook 1951, pp.214-217 (Saharanpur); pp.180-183 (Muzaffarnagar); pp.218-221 (Meerut); and pp.198-201 (Bulandshahr).

and increased substantially in all the districts during the two subsequent decades. Upper Doab and its districts ultimately had a net increase in the double cropped area in 1951. The gain in the region amounted to 452,53 acres or about 57.6 per cent of the area in 1901. The corresponding

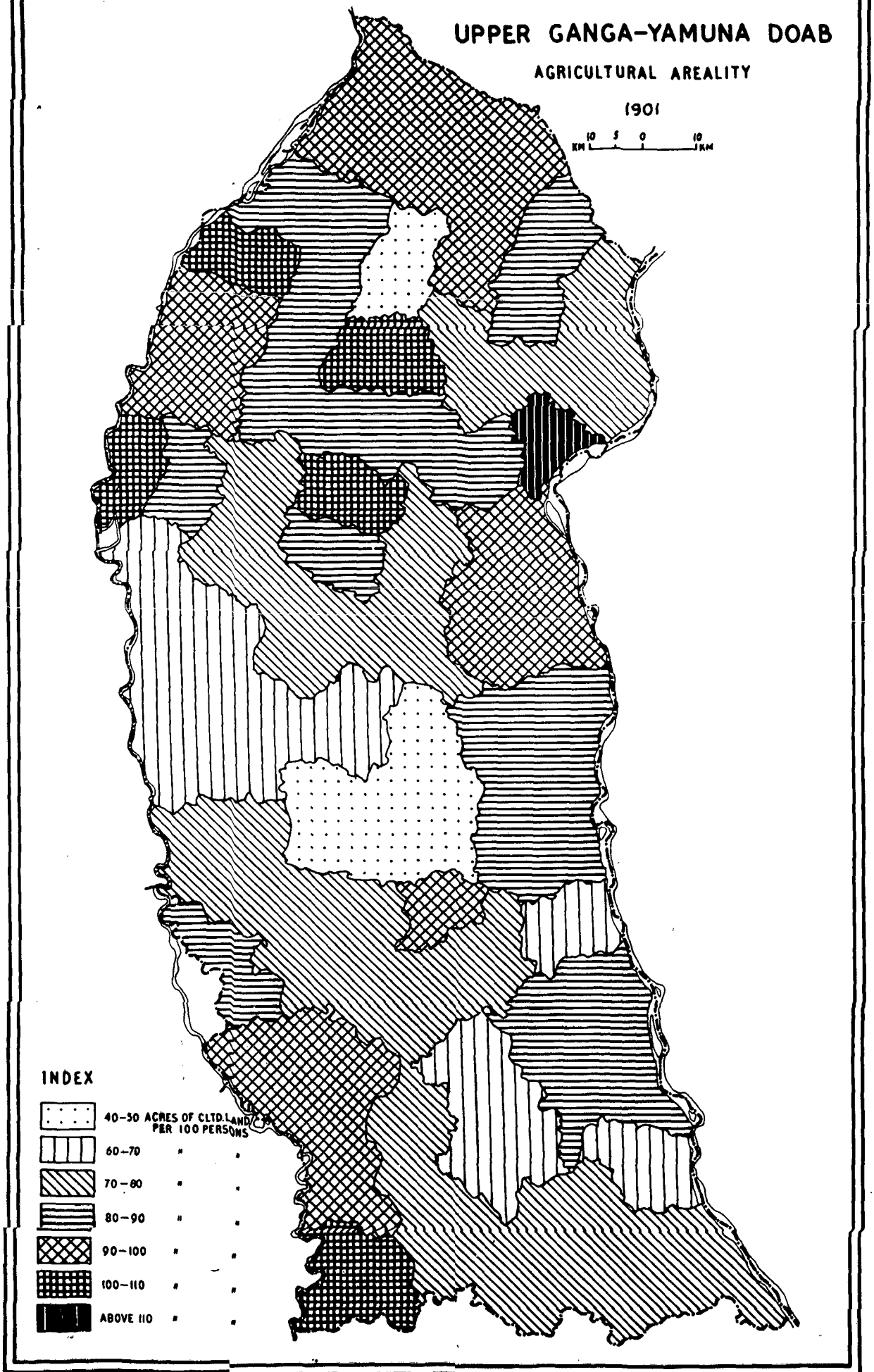
proportions for the districts were 67,857 acres or 31.8 per cent in Saharanpur, 95,362 acres or 70.8 per cent in Muzaffarnagar, 186,045 acres or 83.7 per cent in Meerut and 103,266 acres or 48.0 per cent in Bulandshahr. This rate of increase has clearly been considerable and greater than the index of accumulated growth of population. The steadines with which the double cropped acreage has been increasing after the temporary decline due to the depression of the third decade has been a gratifying aspect of the agricultural situation and indicates the high potential which the districts of Upper Doab possess in this respect.

That even this rate of increase in the double cropped area could not help the areality keep pace with the growth of population is evident from the fact that the per capita share of cultivated land after making an addition of 1,237,120 acres to the total area sown in 1951 in Upper Doab namely 3,719,043 ~~of~~ acres, the areality index calculates to about 0.78 per head. The tahsil-wise distribution of agricultural areality in 1951 is shown in Fig. 72. The 1951 index was clearly in defect of cultivated area per capita in 1901 which after making full allowance for double cropped area of 784,590 acres amounted to about 0.95 per head. Thus the increase in the double cropped area during fifty years could not amelior-iate the areality situation beyond 0.03 or about 3 per cent because, as has already been noted, the loss in cultivated area from 1901 to 1951 without allowing for double cropped acreage amounted to about 0.2 acres whereas with full allowance for the area sown more than once the loss amounted to about 0.17 acre per head. The distribution of agricultural areality by tahsils in 1901 is shown in Fig. 73. A comparison of the Figs. 72 and 73



Source of Data: Distt. Census Handbooks and Records of Agricultural Deptt. of Uttar Pradesh.

FIG 72



Source of Data: Distt Gaz. 1903

FIG. 73

clearly indicates the details of decline in the cultivation per capita in Upper Doab.

3. CROPPING PATTERN

Examination of the changes in cropping pattern is important inasmuch as it may reveal the position of food supply for the growing population of the region. Tables CXXXVI,CXXXVII,CXXXVIII, and CXXXIX give proportionate areas under different crops in each of four districts on quinquennial average basis. A notable feature of the acreage under staple food crops has been a gradual and steady decline in all the districts of the region. The proportion of the area under staple food crops which stood above seventy per cent of the total cropped area in the districts of Saharanpur and Bulandshahr and above sixty-four per cent in the districts of Muzaffarnagar and Meerut at the end of the quinquennium 1901-06 declined to less than sixty-nine per cent in Saharanpur and Bulandshahr and to less than fifty-eight per cent in Muzaffarnagar and Meerut at the end of the quinquennium 1946-51. This was in sharp contrast with the situation in the State as a whole which was characterised by a slight increase from 70.32 per cent (1901-06) to 71.90 per cent (1946-51).

In view of the phenomenal increase in population the decline in the cultivation of food crops is rather hard to account for. The only plausible explanation seems to be that owing to rapid urbanization in the districts (vide Ch.VI.) factories and industrial plants based on

agricultural raw materials such as sugarcane, cotton, tobacco, oilseeds etc. came up in increasing numbers and the cultivators were lured to raising more cash crops by the prospects of getting financially better off through the cash proceeds of the nonfood crops. Gradually and steadily the whole agricultural pattern became more and more cash and coin oriented and the food cultivation declined proportionately. The unconformity of a highly progressive population and a rather regressive food crop acreage became quite confounded by the turn of the half century and a situation of food scarcity developed despite the high productivity of the soil and adequate increase in irrigation facilities.

TABLE CXXXVI

PERCENTAGE OF AREA UNDER SELECTED FOOD CROPS BY QUINQUENNIAL AVERAGE IN SAHARANPUR FROM 1901 to 1951

Average for the quinquennium	Percentage of cropped area under food crops								
	Rice	Wheat	Barley	Juar	Bajra	Maize	Gram	Total	Others
1	2	3	4	5	6	7	8	9	10
1901-06	12.2	33.0	3.7	1.0	5.9	7.7	11.0	74.5	25.5
1906-11	11.8	32.6	4.0	0.6	6.0	7.6	16.1	75.7	21.3
1911-16	9.2	33.5	4.2	0.5	5.6	6.0	13.4	72.4	27.6
1911-21	11.6	31.8	4.3	0.4	5.5	7.4	10.0	71.0	29.0
1921-26	10.3	31.1	3.5	0.3	5.7	5.9	14.6	71.4	28.6
1926-31	11.0	31.4	3.5	0.4	5.8	6.6	11.3	70.0	30.0
1931-36	9.9	27.8	2.1	0.3	5.3	6.7	15.8	67.9	32.1
1936-41	11.9	27.6	1.7	0.2	5.0	7.2	13.3	66.9	33.1
1941-46	10.6	27.2	1.7	0.2	6.0	7.1	14.9	67.7	32.3
1946-51	12.8	25.1	1.5	0.1	5.1	6.3	15.5	66.4	33.6

S O U R C E : Calculations based on data from Agricultural Statistics District Census Handbook, 1951.

TABLE CXXXVII

PERCENTAGE OF AREA UNDER SELECTED FOOD CROPS BY QUINQUENNIAL AVERAGE IN MUZAFFARNAGAR, FROM 1901 to 1951

Average for the quinquennium	Percentage of cropped area under food crops								
	Rice	Wheat	Barley	Juar	Bajra	Maize	Gram	Total food crops	Others
1	2	3	4	5	6	7	8	9	10
1901-06	6.4	32.0	3.8	2.9	3.9	5.5	12.5	67.0	33.0
1906-11	4.8	30.3	4.2	2.7	4.3	5.7	11.5	63.5	36.5
1911-16	4.0	31.2	4.5	2.0	2.8	3.9	15.5	63.9	36.1
1916-21	4.8	30.1	4.2	1.9	2.1	5.2	10.2	58.5	41.5
1921-26	3.6	30.5	4.4	1.9	3.4	3.8	15.2	62.8	37.2
1926-31	4.6	29.3	4.6	1.9	3.3	4.6	10.0	58.3	41.7
1931-36	4.3	27.8	2.6	1.9	3.5	4.7	15.6	60.4	39.6
1936-41	4.7	28.5	1.7	1.3	3.2	5.2	10.9	55.5	44.5
1941-46	4.4	27.8	1.5	1.2	4.3	5.2	12.6	57.0	43.0
1946-51	5.8	25.7	1.4	1.1	3.6	4.5	14.0	56.1	43.9

S O U R C E : Calculations based on data from Agricultural Statistics, District Census Handbook, 1951.

TABLE CXXXVIII

PERCENTAGE DISTRIBUTION OF AREA UNDER SELECTED FOOD CROPS BY QUINQUENNIAL AVERAGE IN MEERUT, FROM 1901 to 1951

Average for the quinquennium	Percentage of cropped area under food crops								
	Rice	Wheat	Barley	Juar	Bajra	Maize	Gram	Total food crops	Others
1	2	3	4	5	6	7	8	9	10
1901-06	1.8	28.5	4.8	7.9	2.7	8.9	9.9	64.5	35.5
1906-11	1.2	25.3	5.2	7.7	3.1	8.7	10.9	62.1	37.9
1911-16	0.8	26.5	5.2	6.4	2.5	7.0	13.0	61.4	38.6
1916-21	1.1	25.5	5.5	6.0	2.7	9.0	8.5	58.3	41.7
1921-26	0.9	27.3	4.4	7.4	3.0	6.2	12.7	61.9	38.1
1926-31	1.3	26.9	4.3	8.0	3.3	6.1	7.9	58.4	41.6
1931-36	1.3	25.8	3.3	7.9	3.3	7.3	13.3	62.2	37.8
1936-41	1.2	26.1	3.2	7.0	3.8	8.3	9.6	58.2	41.8
1941-46	1.1	26.0	3.3	5.8	5.1	8.4	10.0	59.7	40.3
1946-51	2.1	23.1	3.1	5.4	4.9	7.3	11.4	57.3	42.7

S O U R C E : Calculations based on data from Agricultural Statistics, District Census Handbook, 1951.

TABLE CXXXIX

PERCENTAGE DISTRIBUTION OF AREA UNDER SELECTED FOOD CROPS BY QUINQUENNIAL AVERAGE IN BULANDSHAHR FROM 1901 to 1951

Average for the quinquennium	Percentage of cropped area under food crops								
	Rice	Wheat	Barley	Juar	Bajra	Maize	Gram	Total food crops	Others
1	2	3	4	5	6	7	8	9	10
1901-06	0.4	21.8	12.0	9.0	5.8	10.8	11.2	70.0	30.0
1906-11	0.3	16.4	13.5	8.8	6.6	10.7	10.6	66.9	33.1
1911-16	0.2	17.2	14.0	7.5	6.3	10.0	11.7	66.9	33.1
1916-21	0.3	16.2	14.0	7.0	7.7	11.2	9.9	66.3	33.7
1921-26	0.2	18.2	12.1	8.3	6.8	9.5	13.5	68.6	31.4
1926-31	0.2	17.4	14.8	8.7	7.1	10.3	7.3	65.8	34.2
1931-36	0.3	18.3	12.3	9.0	7.0	10.0	9.3	66.2	33.8
1936-41	0.3	18.6	13.0	9.0	6.2	11.9	8.0	67.0	33.0
1941-46	0.4	18.4	13.6	8.6	8.9	12.2	7.3	69.4	30.6
1946-51	0.9	17.1	12.8	7.4	9.3	11.6	9.2	68.3	31.7

S O U R C E : Calculations based on data from Agricultural Statistics, District Census Handbook, 1951.

The only way out of this dilemma seems to be through increase in yield rates of the staple foodgrains. Unfortunately yield-rates for the districts are not available for earlier decades and the yield-rates that have been determined for larger regions are far from satisfactory or reliable.[5] Besides, the comparison between the earlier figures and the recent estimates of the Indian Council of Agricultural Research (A.C.A.R.) is almost impossible to make as the assessment of the former was based on standard normal crop based on an anna condition whereas the A.C.A.R. has adopted the system of random sampling for the estimation of yields. The two systems differ so greatly that it is almost futile to attempt any comparison. However the estimates of average yield of rice and wheat given by the I.C.A.R sample survey for the quinquennium 1945-46 to 1950-51 show that in the West Plain region to which Upper Doab belongs the yield of rice has steadily declined from 600 lbs. per acre to 495 lbs. per acre and the yield of wheat has increased to 826 lbs. per acre in 1950-51 from 583 lbs. per acre in 1945-46. Though both the period and the crops for which experimental surveys have been carried out are very limited and do not justify for any definite conclusion about yield trends it may, however, be easily appreciated that the yield trend has so far provided no compensation for the downward trend in food acreage per capita and as such further deterioration in the food supply position is more likely than not.

4. FOODGRAINS PER CAPITA

Because of the non-availability of detailed data about crop-yields it is not possible to examine the progress of total production of foodgrains

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5. Sample Surveys for the Estimation of Yield of Food Crops, An.I.C.A.R Publication.

and the net consumable grains available per head in relation to the growth of population. Only a rough estimate of the total outturn of food grains in Upper Doab can be made for the years 1901-02 and 1950-51 on the basis of casual references of yield-rates in the district gazetteers, records of agricultural directorate of U.P., the State averages for yields of major food crops and the findings of I.C.A.R. sample survey experiments conducted in various parts of the State. Accordingly it appears that the total production of foodgrains (rice, wheat, millets, maize,barley, and gram) in Upper Doab was about 1,020,000 tons in 1901. After 50 years the total outturn rose to about 1,100,000 tons thus making a nominal increase of only about 80,000 tons or 7.84 per cent whereas the population during the same period recorded an increase of about 38.2 per cent. From these figures it will be seen that in 1901 every man, woman and child had a supply of about 495 lbs. of foodgrains per year or about 21.6 oz. a day, but by 1951 this per capita share of foodgrains went down to about 390 lbs. per year or about 17.09 oz. a day.[6]

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6. The equivalent caloric intake corresponding to these figures works to about 2,160 calories per day in 1901 and about 1,709 calories per day in 1951. Since according to the estimates of Indian Council of Medical Research (vide Special Report No.25, p.23) an average man in U.P. gets about 82.7 per cent of his food calories from cereals, the total food calories available per capita declined to about 2,067 in 1951 from about 2,610 in 1901. The figure for 1951 is fairly confirmed by the results of sample landuse survey of fourteen villages of Upper Doab contained in the unpublished thesis of Dr. Majid (Land Utilization in Upper Ganga-Yamuna Doab , Department of Geography, M.U. Aligarh 1963). According to his findings in 1961 five villages had a caloric intake of a little over 2,300, six villages had between 2,100 and 2,153 and three villages had between 1,930 and 2,020. This clearly indicates the magnitude of reduction in the total food calories available per capita during the fifty years from 1901-1951.

These figures, though rough and exclusive of imported and exported amounts indicate the extent to which the position of foodgrain supply has deteriorated owing to the rapid growth in the population of the region. Tha the average person's diet has become increasingly inadequate due to the rapi bourgeoning of the population can be easily noted by comparing the per adult food calories available with the actual number of calories required for an adult. According to the Nutrition Advisory Committee of the Indian Research Fund Association the actual number of calories required for an adult are as contained in table CXL.

TABLE CXL

THE ACTUAL NUMBER OF CALORIES REQUIRED FOR AN INDIAN ADULT BY SEX AND NATURE OF WORK

Particulars	Nature of work	Net calories required
1	2	3
Man (120 lbs.)	1. Light work	2,400
	2. Moderate work	3,000
	3. Very hard work	3,600
Woman (100 lbs.)	1. Light work	2,100
	2. Moderate work	2,500
	3. Very hard work	3,000
	4. Pregnancy	2,100
	5. Lactation	2,700

S O U R C E : Health Bulletin No.23, The Nutrition Value of Indian Foods an the Planning of Satisfactory Diets.

Using the conversion rate adopted by the chief statistician of the U.P. Agricultural Department namely 0.85, the per adult amount of foodgrains corresponding to the per capita amount for 1901 and 1951 calculate to be about 3,070 and 2,420 respectively. This shows that the position in 1901 was very nearly adequate but as a result of 38.2 per cent increase in the population the position of the availability of food calories has, by 1951, gone down for below the bare adequate level.

5. SIZE OF AGRICULTURAL HOLDINGS

Statistical details about the size of agricultural holdings for earlier decades are not available beyond the generalized estimates about the State as a whole or the larger divisions thereof.[7] It was in 1946-47 that an attempt was made for the first time to collect and prepare district-wise data about the size of agricultural holdings in U.P. This work was done by the U.P. Zamindari Abolition Committee and the results were published in the second volume of the Committee's Report and were later reproduced in the Census of India, U.P., 1951, Part I-B, Subsidiary Tables on pages 75-77.

The data collected by the Z.A. Committee are of great value as they provide fairly reliable information about the ratio between the cultivator and the cultivated area. But unfortunately the effect of population growth on size of holdings cannot possibly be worked out statistically for individual districts because similar data for census years prior to 1951 are not available. It may, however, be noted that under the personal laws

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7. Estimates about the size of holdings were made by U.P. Banking Enquiry Committee in 1929 and according to its findings the average size of holding in the Western Plain Division comprising mainly Agra and

of inheritance operating in the State the holdings have constantly been divided and subdivided among the legatees. As the population numbers have been rapidly increasing since 1921 the number of claimants for division has also been proportionately increasing and in this way the growth of population has directly affected the size of agricultural holdings. It is in fact the cognizance of this effect that is implicit in the finding of the Z.A. Committee that " the fractionalization of holdings amongst peasantry which made desperate attempts to retain its rights of cultivation was one of the main characteristic features of the State's agricultural pattern."[8] On the evidence of the existing records and reports[9] it may be said with confidence that for the last hundred years or so there has been a rapid and steady shrinking in the size of holdings which is adversely affecting the efficiency of agriculture and the well being of the agriculturist.

Meerut divisions was between 8 to 10.5 acres. Then in 1931 The Agrarian Distress Enquiry Committee strongly disagreed with the findings of the Banking Enquiry Committee and placed the average size of holding in the State at about 5 acres. In the same year Turner in his Report on the Census of U.P., 1931 arrived at 6.7 acres as the average size of holding in the State. Later on in 1945 the Famine Inquiry Commission came to the conclusion that the average for the whole of the State was about 6 acres. Evidently these estimates were with respect to either the whole State or to its larger divisions and as such do not provide basis for tracing variation in size of holding on district level.

8. Report of the U.P. Zamindari Abolition Committee, 1948, p.11.
9. Here may be cited the findings of Dr. Harold Mann's survey " Life and Labour in a Deccan Village " which according to Rajeshwari Parshad were valid for U.P. Villages as much as they were for Deccan Villages he surveyed in 1917. Dr. Mann is quoted by Rajeshwari Parshad (in his Census Report of U.P. 1951, p.226) to have reported that " it is evident that in the last sixty or seventy years the character of land holding has altogether changed. In the pre-British days and the early days of British rule the holdings were of a fair size, most frequently more than 9 or 10 acres. While individual holdings of less than 2 acres were hardly known. Now the number of holdings has more than doubled and 81 per cent of these are under 10 acres in size while no less than 60 per cent are less than 5 acres." Major Erskine's enquiry in 487 representative villages of Avadh (i.e. Central and Eastern U.P.) in 1880 led him to the conclusion that the average

contd.

Based on the figures taken from various reports etc. detailed in the footnote No.9 and the data given in the subsidiary table 4.1 ofthe U.P. Census 1951 part I-B the probable variation in the size of holdings in the districts of Upper Doab are given in table CXLI. From the table it is clearly evident that with the progress of population (as detailed in earlier chapters) there has been a gradual shrinking of the size of holding in Upper Doab.

TABLE CXLI

VARIATION IN THE AVERAGE SIZE OF AGRICULTURAL HOLDINGS BY DISTRICT DURING FIFTY YEARS, 1901 to 1951

District	Average size of holding in			
	1901		1951	
1	2		3	
Saharanpur	N.A.*	Acres	8.4	acres
Muzaffarnagar	N.A.*	"	6.8	"
Meerut	9.4	"	5.7	"
Bulandshahr	12.0	"	5.4	"

* See footnote No.9

S O U R C E : Calculations based on the data gathered from Final Settlement Reports of the district of Saharanpur, Muzaffarnagar, Meerut and Bulandshahr, the Subsidiary Table Census of India, U.P. 1951, Part I.B and the District Census Handbooks, 1951.

holding had shrunk to about 5 acres by the early eighteen-eighties. Major Erskines findings compared fairly well with the observation of Bennet contained in his Final Settlement Report of the Gonda district, 1877 (vide Rajeshwari Parshad op.cit.p.226). Miller has given no information about the average size of holdings in Muzaffarnagar. In the Final Report on the Settlement of Muzaffarnagar district, 1892he reports that " no census has been taken of the number of cultivating proprietors, of

...contd.

Size of Holdings in 1951

In sharp contrast to the findings of Dr. Mann that " in early days of British rule ... individual holdings of less than 2 acres were hardly known," the agricultural situation in 1951 in Upper Doab was conspicuous for substantially high percentage of holdings of less than 2 acres which ranged between 36.2 in Saharanpur and 54.1 in Meerut. The details of the holdings by districts which are given for eighteen sizes in the Subsidiary Table 4.1, of the U.P. Census 1951 are for the sake of facility regrouped into six sizes and the percentage distribution of holdings in each size is shown in table CXLII. In Upper Doab as a whole almost 46 per cent of the holdings were of less than 2 acres and a little over 26 per cent were between 2 to 5 acres. Though the proportion of the holdings of under 2 acres was substantially smaller than the State average of about 56 per cent it is, however, clearly evident that the small holdings were quite predominant in this region also. On the contrary the proportion of large size holdings of 18 acres or more was only about 3 per cent though it was of course about one and a-half times of the State average of nearly 2 per cent.

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9. contd.

occupancy tenants and the like" (Statement 112, p.45.), Stoker in his Final Report on the Settlement of Bulandshahr 1891 has put the average size of holdings at 12 acres. (" Taking one part of the district with another" to quote from him" it would certainly not be an excessive estimate to place the average area as high as 12 acres, and even a higher figure would not be unreasonable." Statement 32, p.22). Gillan in his Report on the Settlement of Meerut 1901 has placed the average size in the district at 9 acres, (9.2 acres to be precise, vide the table on page 10 statement 27). Porter in his Report on the Settlement of Saharanpur 1891 has refrained from giving any estimate probably because like Muzaffarnagar in Saharanpur, too, no census of cultivating proprietors was taken. From piecing together these casual reports and evidences and comparing them with the position in 1951 it may be concluded with some confidence that the shrinking of agricultural holdings has taken place on a substantial scale during the first fifty years of the present century.

TABLE CXLII

PERCENTAL DISTRIBUTION OF AGRICULTURAL HOLDINGS ACCORDING TO THE SIZE IN UPPER DOAB BY DISTRICTS AND IN U.P., 1951

District	Under 2 acres	2 to 5 acres	5 to 8 acres	8 to 12 acres	12 to 18 acres	18 acres and over
1	2	3	4	5	6	7
Saharanpur	36.2	27.1	15.2	10.6	6.4	4.5
Muzaffarnagar	45.1	24.6	12.3	8.4	5.4	4.2
Meerut	54.1	25.2	10.3	5.8	2.9	1.9
Bulandshahr	48.2	29.1	11.4	5.9	2.9	1.7
U.G.Y. Doab	45.9	26.6	12.3	7.7	4.4	3.1
U.P.	55.8	25.4	9.6	4.9	2.4	1.9

S O U R C E : Census of India 1951, Vol.II, U.P., Part I-B, Subsidiary Tables.

As is evident from the table there was considerable variation in the proportion of different sizes of holdings among the districts of the region. The lowest proportion of less than 2 acres was in Saharanpur. The proportion gradually increased southwards and attained maximum value in Meerut and then declined again in Bulandshahr which district, nevertheless, had the second highest proportion. The pattern of regional variation in the proportion of large size holdings was just the reverse: Saharanpur had the highest proportion of 4.5 per cent. The proportion declined southwards and attained the minimum value in Bulandshahr district. This regional pattern is suggestive of close relation between the size of holdings and the growth of population. The percentage increase of general population during fifty years was the lowest in Saharanpur (28.88 per cent) and highest in Meerut 48.11 per cent (vide table LV). It, therefore, very seems/

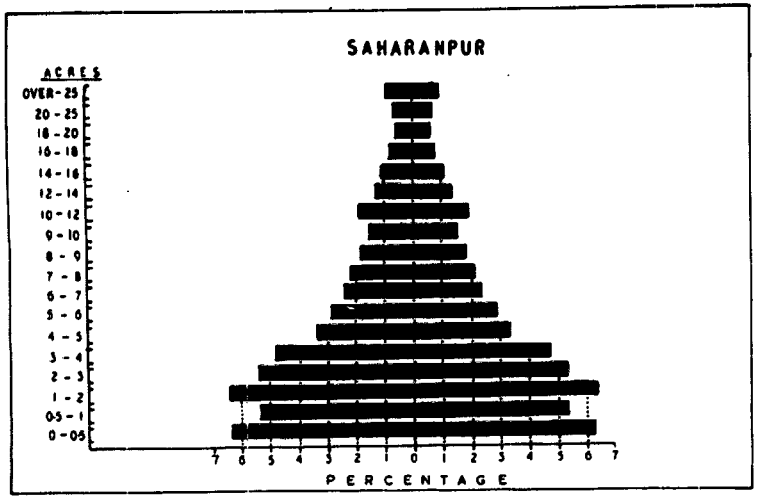
probable that the progress of shrinking and fragmentation of holdings has been very much directly proportional to the growth of population.

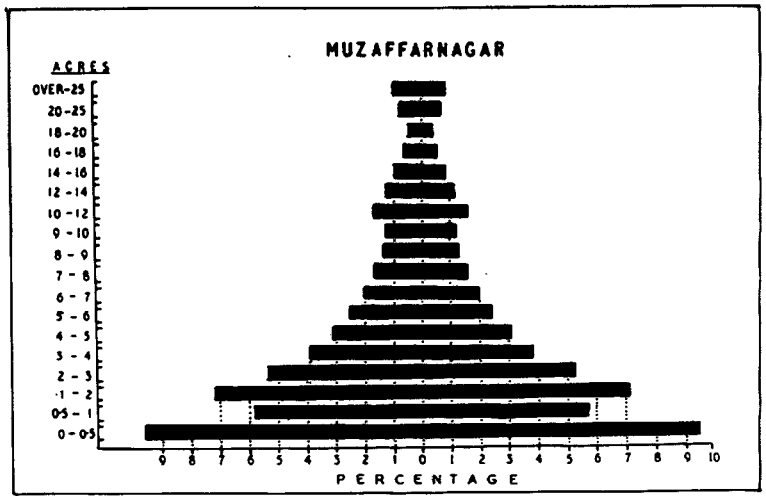
The gravity of the implications of lag in cultivated area and yield-rates relative to the increase of population has become more confounded by the consequent fragmentation of agricultural holdings which has adversely affected the efficiency of agriculture and has most probably been a contributing factor in retarding the yield-rates despite considerable improvements in irrigation, transport, and fertilizer facilities.

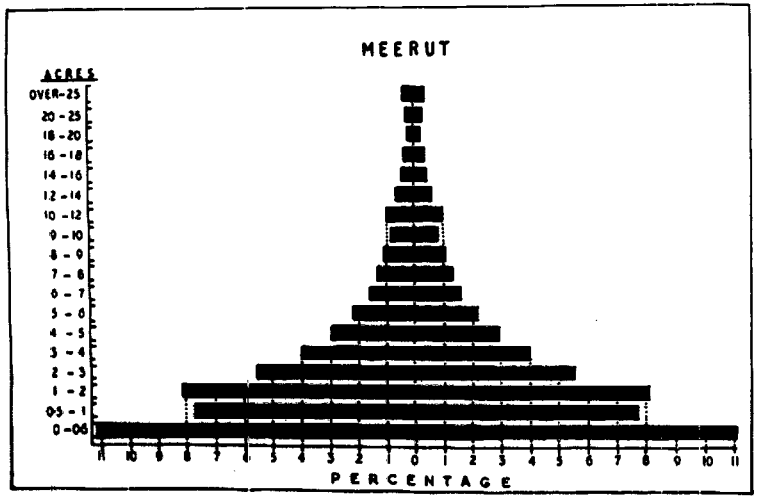
The predominance of small size holdings, which is a very significant feature of Upper Doab's agriculture, and better be gauged by the examination of the pyramids of the districts shown in Fig.74 and the quartile distribution given in table CXLIII. The broad base structure of these pyramids reminds of the similar form of age pyramids and is suggestive of some direct correspondence between the progressive nature of the population and the fragmentation of agricultural holdings. The quartile distribution clearly emphasises that in Upper Doab as a whole out of 100 holdings there were 50 of less than 2.35 acres and 50 of a bigger size. Among the former 50 half were below 0.78 acres and half above that figure whereas in the latter, 25 were below 5.49 acres and as many above that size. This shows the high predominance of small holdings as the quartile analysis indicates that there were no less than 75 holdings out of 100 which were below 5.49 acres in size leaving 25 holdings having a size bigger than that.

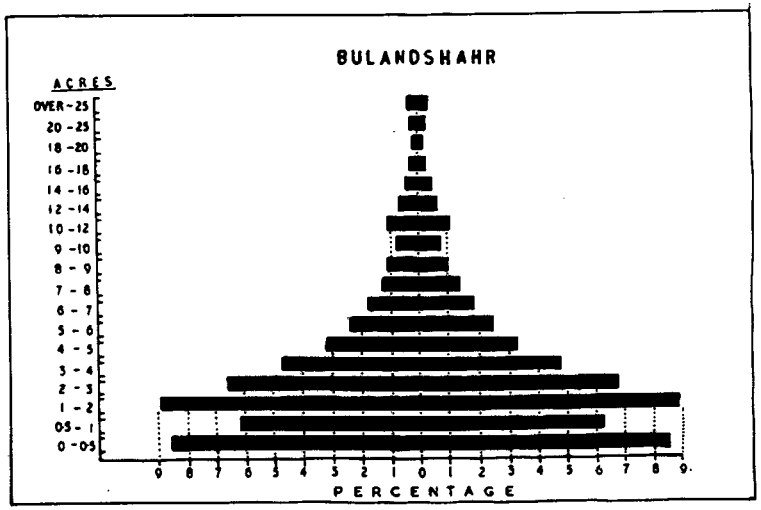
That there was considerable variation in different parts of the region is explicity impressed by the table. The small holdings were most predominant in Meerut district where the median worked to be 1.75 acres.

PERCENTAGE DISTRIBUTION OF AGRICULTURAL HOLDINGS ACCORDING TO SIZE OF HOLDINGS BY DISTRICTS 1951









BASED ON TABLE
U.P. PT. I-B SUBSIDIARY TABLES, 1951

FIG. 74

Saharanpur district other than had comparatively the greatest number of fairly large size holdings: the median for the district calculated to 4.8 acres and even the lower quartile value was higher than the median for both Meerut and Bulandshahr districts.

TABLE CXLIII

QUARTILE DISTRIBUTION OF SIZE OF AGRICULTURAL HOLDINGS IN UPPER DOAB BY DISTRICTS, 1951

District	Lower Quartile (acres)	Median (acres)	Upper Quartile (acres)
1	2	3	4
Saharanpur	2.17	4.80	10.70
Muzaffarnagar	0.75	2.46	6.07
Meerut	0.59	1.75	4.30
Bulandshahr	0.81	2.13	3.37
Upper Doab	0.78	2.35	5.49
U.P.	0.61	1.68	3.94

S O U R C E : Calculations based on statistics from table 4-1 of the Subsidiary Tables, Census of India, 1951, Vol.II, Part I,B.

Scattering of Holdings

Besides continued shrinking of holdings the agriculture of the regio has also been suffering from the malady of incongruous scattering. The division and redivision of holdings has not only tended to shrink the size

of plots but has also caused the tiny plots to scatter over different parts of village. This was due to the natural desire of every sharer to get a piece of each kind of land. According to Agrawal's estimate " on an average a holding whether big or small, is found fragmented into 5 to 8 strips. In some places fragmentation has been carried to such extremes that the holdings are not more than a mere fraction of an acre, making the villages look like jig-saw puzzles".[10] This large scale fragmentation and scattering has been seriously impeding the yield-rates to grow commensurably with the growth of population.

The dispersal and fragmentation of holdings has not only led to the avoidable wastage of human energy, time and resources but has also caused considerable wastage of culturable land in the form of a myriad of zigzag boundaries. The demarcation of boundaries would also often lead to feuds, disputes and litigations seriously hampering the efficiency of the cultivator

The continued shrinking and scattering of holdings poses the question as to whether the holdings are economic and whether they could continue to be economic under the prevalent system of division of plots. Though it is extremely difficult to give a precise definition to an economic holding as it involves a number of factors such as fertility of soil, irrigation facilities and skill and industry of the cultivator in addition to the size of the plot, it is, however, plain that there should be on an average a minimum size below which the holdings should not go if they were to be economic. Of all the estimates of the size of an economic holding Charan Singh's is the most modest being about 6.25 acres.[11] Judging even on

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10. Agrawal, A.N. ' Indian Agriculture and Its Problems', p.25.
11. ' For the State Dr. Stanley Jevons estimated the size of an economic holding to be 20 to 30 acres for reasonable standard of comfort. The U.P. Congress Enquiry Committee, 1946, put the figure at 15 to 20 acres and the U.P. Zamindari Abolition Committee, 1948 at 10 acres. Charan Singh (a member of Z.A. Committee) thought that 6¼ acres was roughly an average economic holding' (vide Census of India 1951, Vol.II, U.P. Part I-A Report p.226).

Charan Singh's modest figure the majority of holdings in Upper Doab were far from being economic. According to 1951 census of holdings the percentage of plots of below 6.0 acres was about 77.6 and there were only about 22.4 per cent which could be considered as economic. Even if the high prosperity of Upper Doab districts be invoked and an arbitrary allowance of 1.25 acres be given to presume the average size of an ' economic holding ' as 5 acres it may be seen that almost 72 per cent of the holdings were below this level of ' economic holding.'

In the context of this situation of ' economic holdings' it is evident that under the prevalent system of inheritance any increase in population is most likely to aggravate the already uneconomic character of holdings and would make it still more difficult for the cultivation and agricultural production to keep pace with the fast growing number of persons.

In view of the gravity of the effects of fragmentation and scattering of holdings on agricultural production the government have prescribed in the Zamindari Abolition and Land Reforms Act of 1950 that no person can acquire a holding of over 30 acres and that no one's holding will be lesser than 6.25 acres. To check the ills of scattering the government have started a programme of consolidation of holdings by revising and improving upon the Act of 1939 which empowered the State government to introduce and enforce consolidation of holdings. The consolidation of holdings is certainly a right step in the right direction but it is yet to be seen how far does it prove to be successful in remedying the ills of the fragmented and scattered holdings.

CHAPTER XI

PRESSURE OF POPULATION ON LAND

Before dealing with the details of the situation of man-land ratio in Upper Doab, it seems worth its while to consider the relative position which this region occupies in the broader perspective of the position in India as well as in the State of Uttar Pradesh. Table CXLIV shows the distribution of total area per head of population in India, U.P. and Upper Doab. It will be seen from the table that in 1951 an average Indian had per capita only 2.25 acres of land compared with 1.15 acres of land in Uttar Pradesh and 0.81 acres of land in Upper Doab. The average areality index in Upper Doab was, therefore, appallingly small being nearly one third of the average for the whole of the country which in itself was very small compared with the world average of 13.54 acres of land per head and was even short of the minimum of 2.5 acres of land according to the western standards. It is, therefore, evidently clear that Upper Doab was, in 1951, under very heavy pressure of population so that an individual had only one-third of the minimum acreage of land according to European standard. In view of the expanding nature of population and fixed character of the area of land the acuteness of the problem of population pressure on land in Upper Doab can be easily appreciated.

VARIATION SINCE 1901

The areality has for obvious reasons varied inversely with the variati in population. According to the assessment of land area in 1901 the total

TABLE CXLIV

LAND PER CAPITA OF GENERAL POPULATION IN INDIA, U.P. AND UPPER DOAB, 1951

Region	Area (in acres)	Population	Land per capita (in acres)
1	2	3	4
India	812,569,600	356,829,485	2.25
U.P.	72,581,760	63,215,742	1.15
Upper Doab	5,139,440	6,356,505	0.81

S O U R C E : Calculations based on data from Census of India 1951, U.P., Part I-A, Report, p.12, and Part II-A General Population Tables.

area of Upper Doab was 8,149 square miles or 5,215,360 acres and the total population was 4,600,694 persons. Thus areality in 1901 worked to about 1.13 acres of land per capita. After fifty years at the time of 1951 census the land area was assessed at 8,021 square miles or 5,139,440 acres whereas the population increased to 6,356,505 persons and consequently the areality reduced to 0.81 acres per capita. Thus while the population recorded an increase of about 38.2 per cent over the total of 1901 the areality decreased by about 28.3 per cent of the 1901 index of areality. The tahsil-wise distribution of areality for the two census years of 1901 and 1951 is given in table CXLV and shown in Figs.75 and 76. The inverse relation between growth of population and decline in land area per capita is atonce conveyed by the comparison of these Figures with Fig.23 showing the third phase of variation of population. Evidently the tahsils of high population growth

PLATE LVI

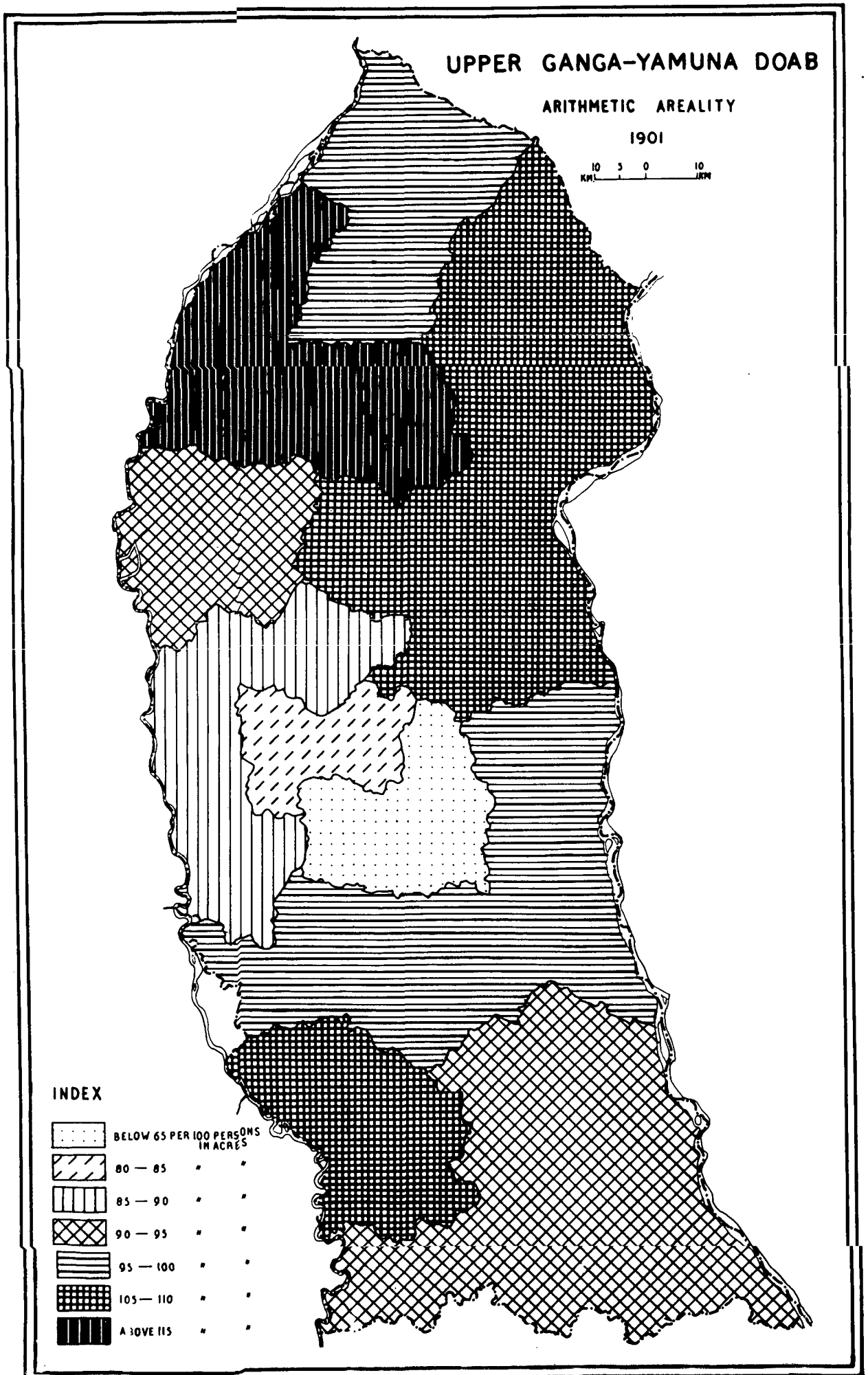
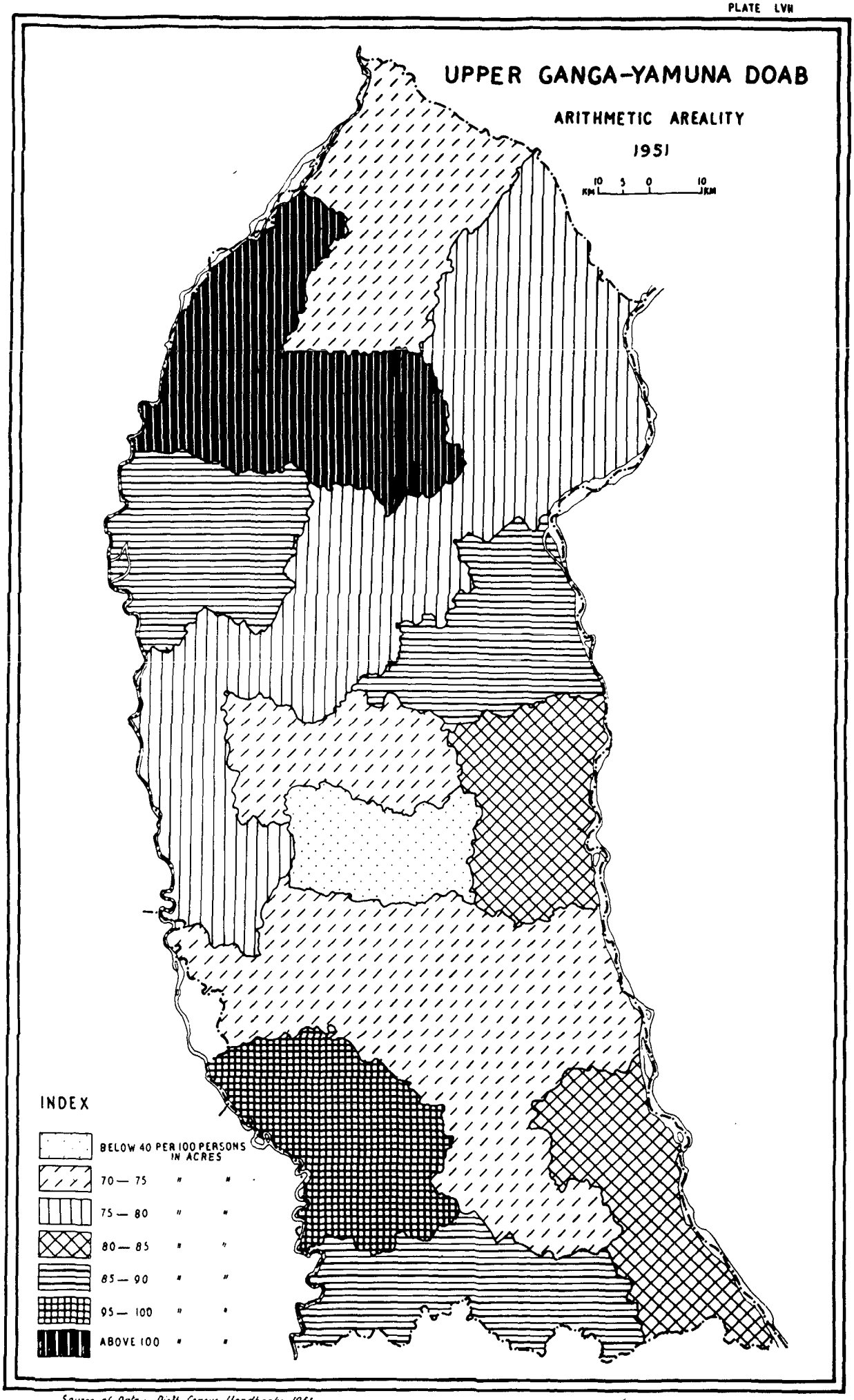


FIG. 75



Source of Data : Distt. Census Handbooks 1951

FIG. 76

TABLE CXLV

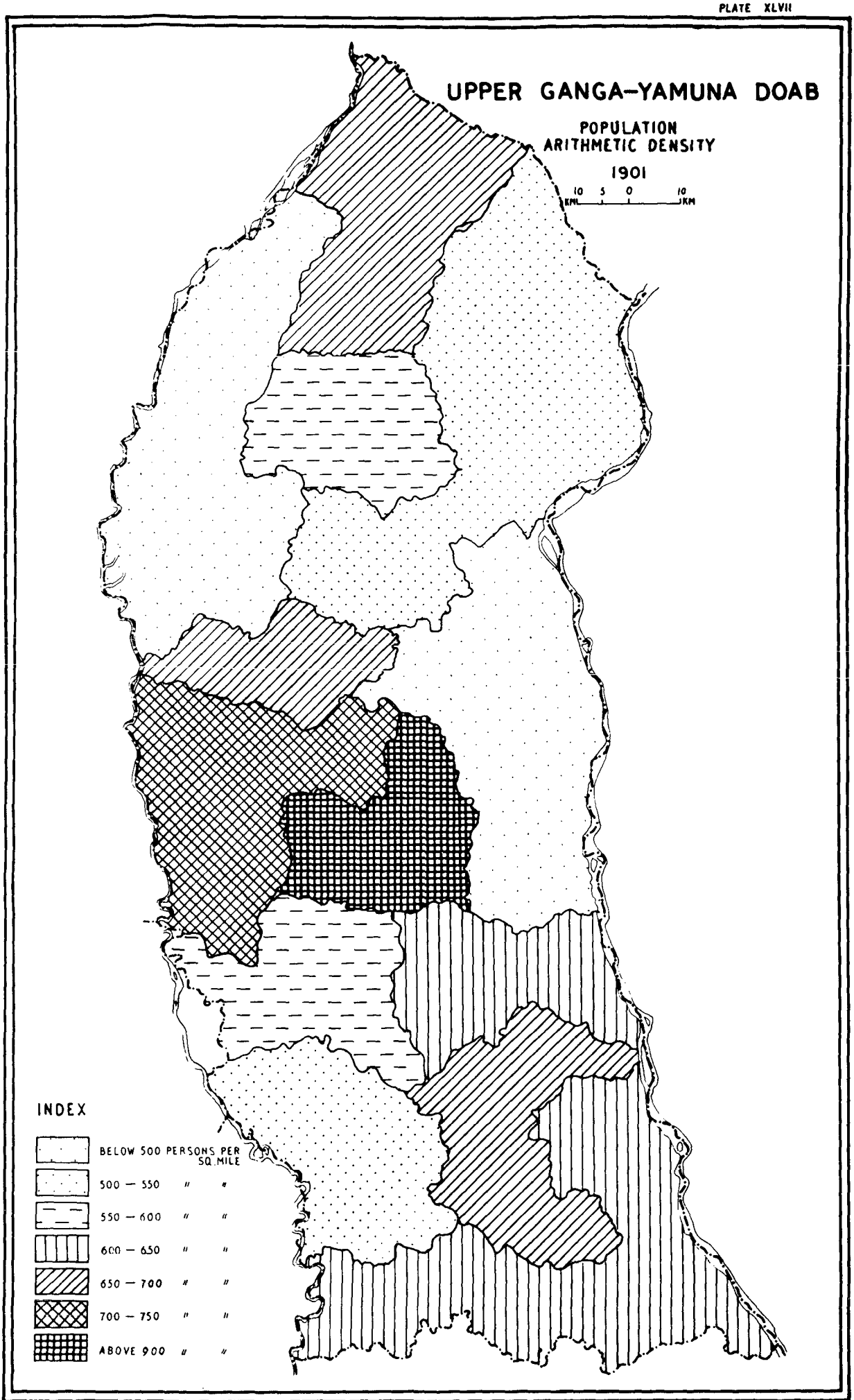
TAHSIL-WISE DISTRIBUTION OF ARITHMETICAL AREALITY FOR 1901 AND 1951

Tahsil	Arithmetical Areality in Acres (in cents)	
	1901	1951
1	2	3
Deoband	112	92
Roorkee	122	110
Nakur	131	120
Saharanpur	94	89
DISTRICT SAHARANPUR	114	101
Budhana	93	70
Jansath	132	100
Kairana	132	88
Muzaffarnagar	123	83
DISTRICT MUZAFFAR-NAGAR	120	85
Baghpat	85	61
Ghaziabad	114	67
Hapur	106	70
Meerut	68	38
Mawana	138	97
Sardhana	88	72
DISTRICT MEERUT	98	64
Bulandshahr	91	67
Anupshahr	102	75
Khurja	102	85
Sikandarabad	126	105
DISTRICT BULAND-SHAHR	107	81

SOURCE : Calculations based on data from District Gazetteers, Census of India 1901, Vol.XVI-A Part II and District Census Handbooks of various districts.

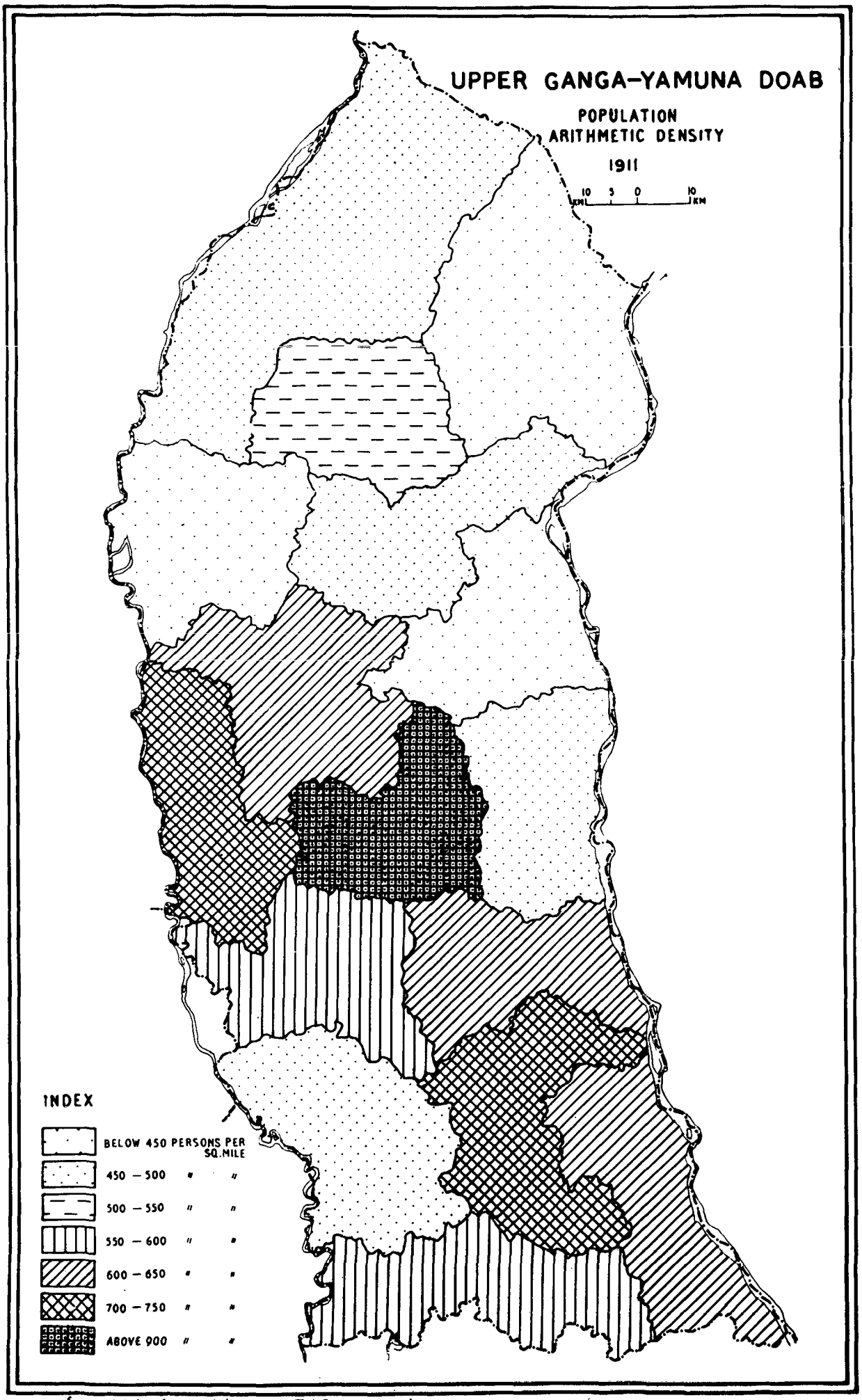
had the greatest reduction in areality index and vice versa. For instance Meerut tahsil which recorded the highest increase in population suffered the greatest loss in areality during the fifty years 1901-1951. On the contrary Nakur tahsil which had the lowest increase in population emerged as having the highest areality in the areality map of 1951. The reasons for this pattern of regional distribution of variation in areality have been the same as those discussed in connection with the variation of population in earlier chapters though of course having a reverse effect in respect of land-man ratio and as such any dilution upon those causes will be no more than a repetition of what has already been explained in full detail.

The density of population, that is, the number of persons per square mile of land is another way of expressing the man-land ratio. The average density for Upper Doab as a whole was about 564 and 792 persons per square mile in 1901 and 1951 respectively. The tahsil-wise distribution of the crude or arithmetical density for the six census years is given in table CXLVI and shown in a set of six maps (Figs. 77 - 82). From these maps it will be seen that gradually and steadily the population has tended to concentrate more and more in those tahsils which had the advantages of better agricultural situation, health conditions, and greater number of towns especially of big size. The peripheral tahsils bordering on the Yamuna and Ganga khadir which ~~are~~ were generally classed as agriculturally precarious and which did not have equally efficient health services and urban development did not experience similar or comparable increase in population density.



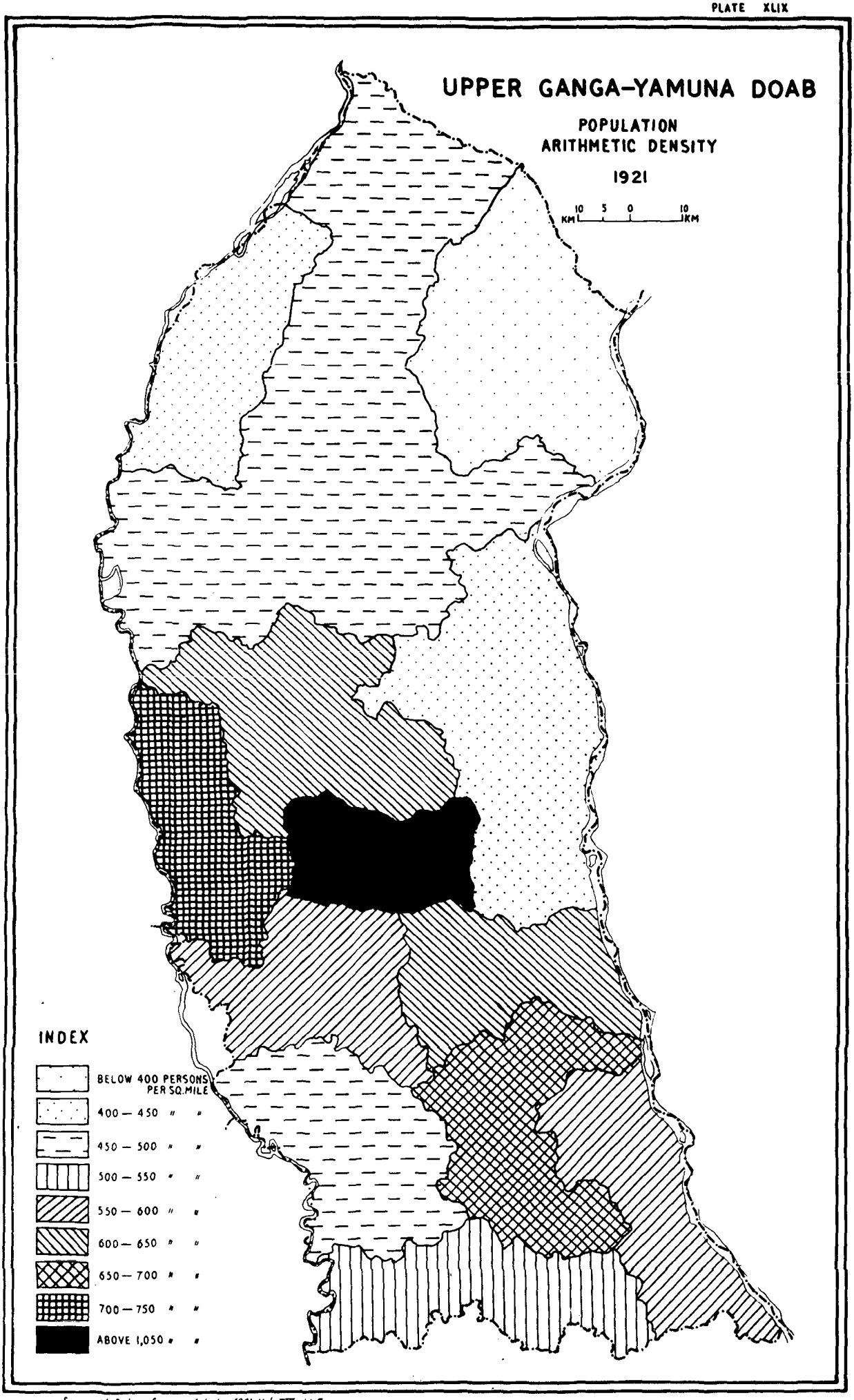
Source of Data : Census of India 1901, Vol. XVI-A, pt. II and Distt. Gaz 1903

FIG. 77



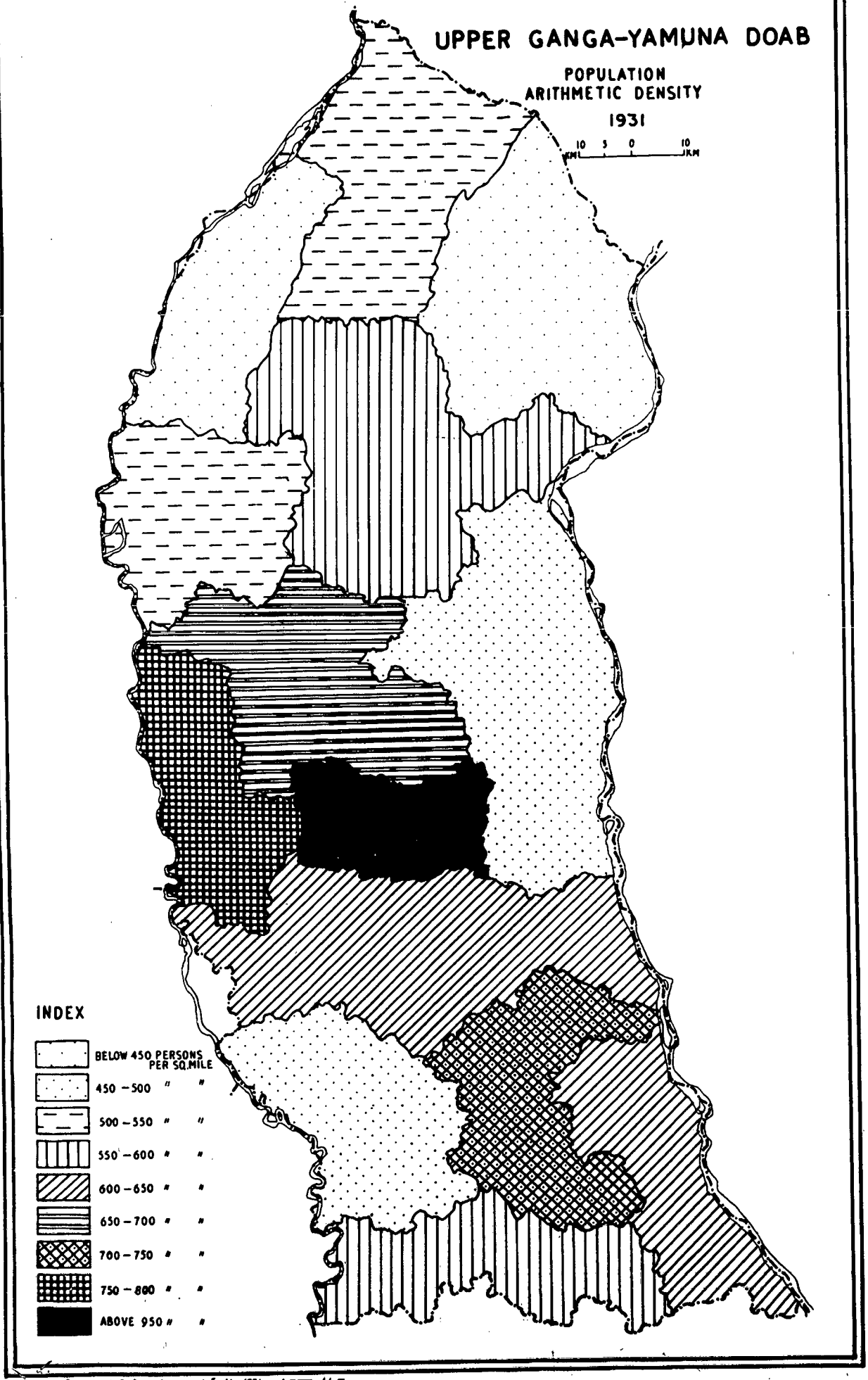
Source of Data: Census of India 1911, Vol. XV, pt. II

FIG. 78



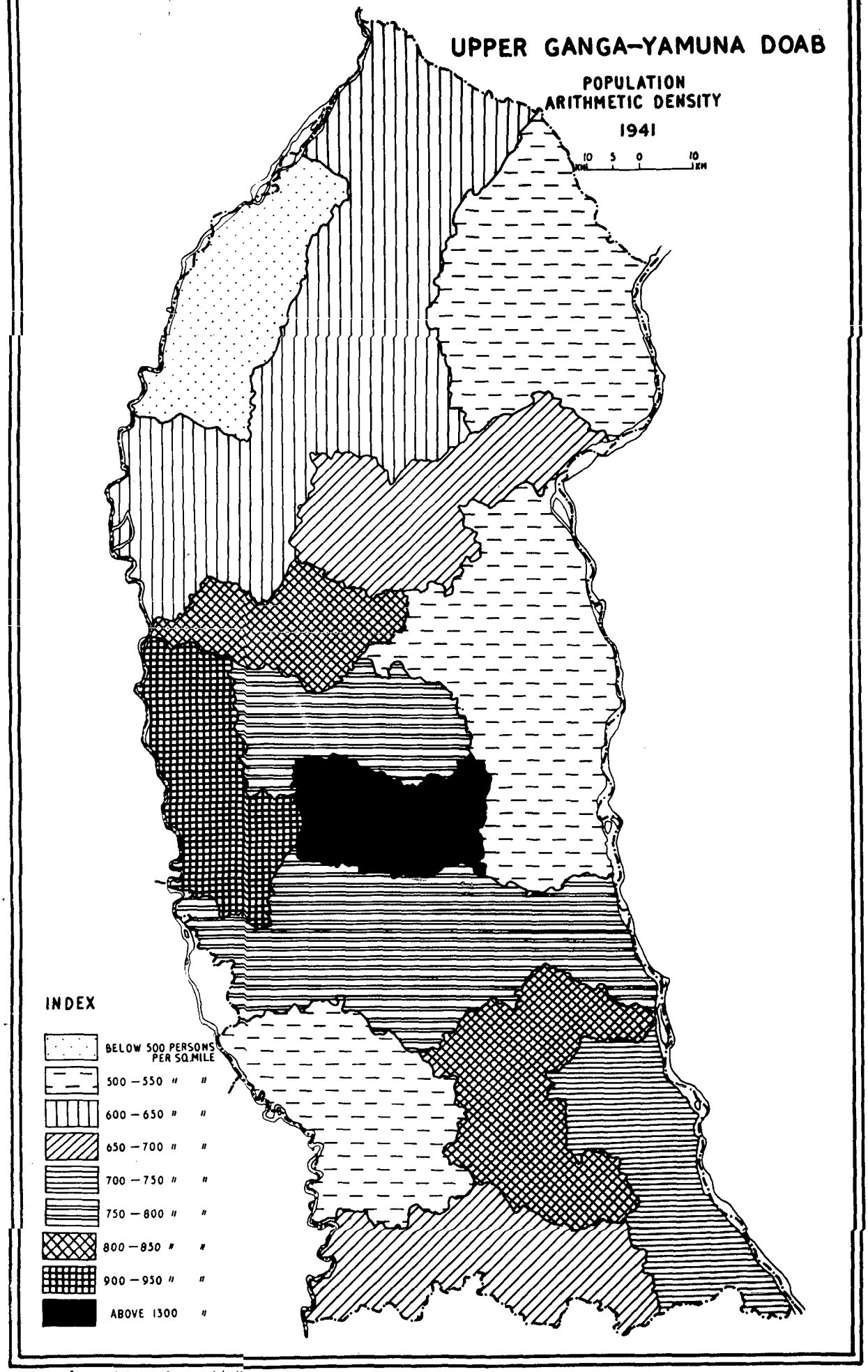
Source of Data : Census of India 1921 Vol. XVI. pt.II

FIG. 79



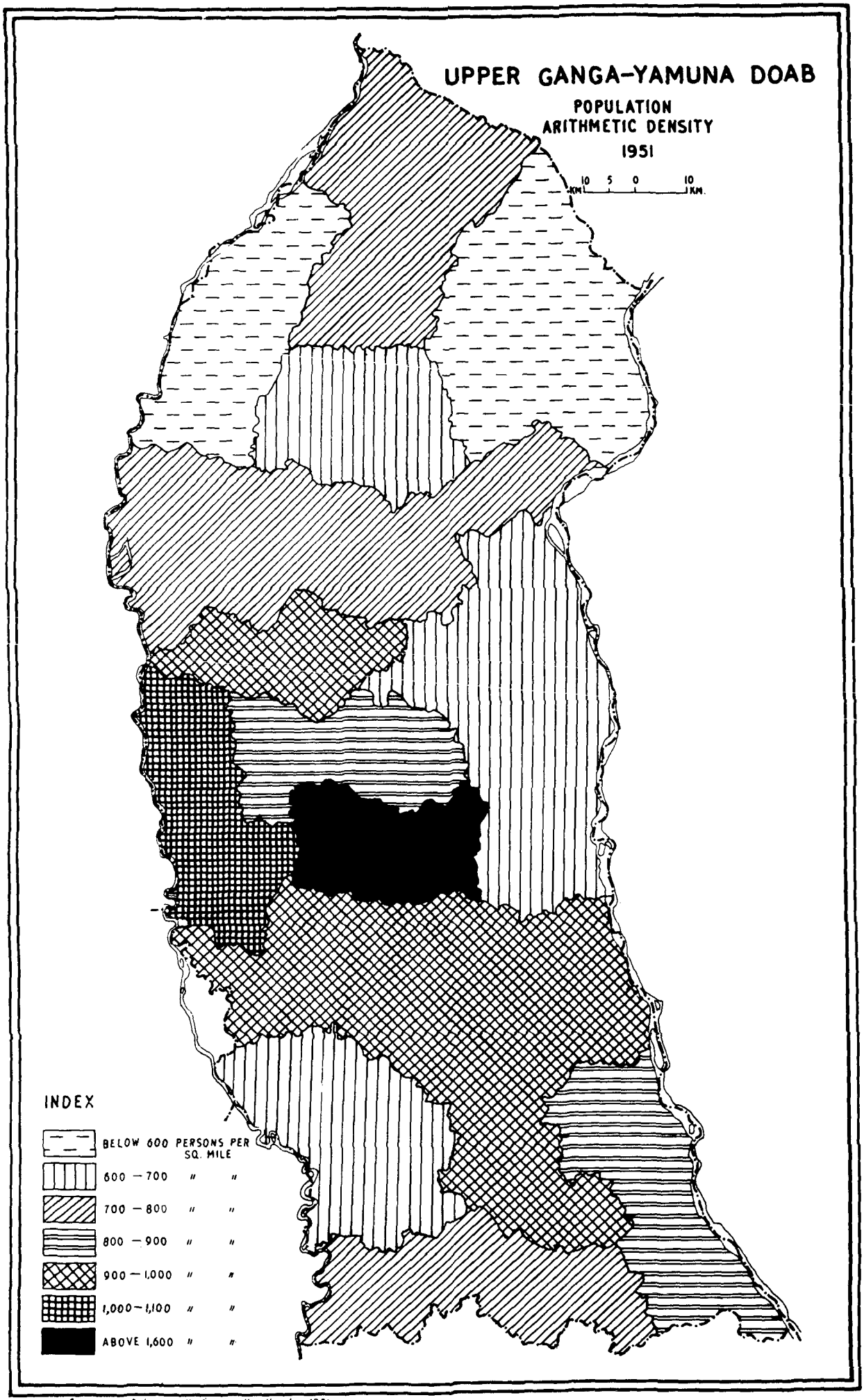
Source of Data : Census of India 1931, vol. XXIII, pt. II

FIG. 80



Source of Data : Census of India 1941, Vol. V

FIG. 81



Source of Data : Distl. Census Handbooks 1951

FIG. 82

TABLE CXLVI

TAHSIL-WISE VARIATION OF ARITHMETIC DENSITY
BY DECADES FROM 1901 TO 1951

Tahsil	Arithmetical density per square mile in					
	1901	1911	1921	1931	1941	1951
1	2	3	4	5	6	7
Deoband	572	531	497	575	617	693
Nakur	488	429	413	440	485	530
Roorkee	522	413	391	438	505	582
Saharanpur	680	497	476	528	603	716
DISTRICT SAHARANPUR*	560	462	440	489	550	630
Budhana	690	617	631	684	803	920
Jansath	486	455	410	463	546	637
Kairana	486	434	455	501	617	716
Muzaffarnagar	520	488	478	567	674	775
DISTRICT MUZAFFARNAGAR	531	483	479	541	646	748
Baghpat	748	733	744	768	905	1043
Ghaziabad	561	566	590	628	759	955
Hapur	603	613	604	649	765	911
Mawana	463	462	440	477	556	661
Meerut	940	921	1055	1161	1342	1697
Sardhana	721	648	621	666	784	893
DISTRICT MEERUT	652	648	652	699	824	992
Anupshahr	626	619	588	631	745	848
Bulandshahr	698	700	671	717	826	957
Khurja	627	562	528	566	659	741
Sikandarabad	507	487	462	477	542	609
DISTRICT BULANDSHAHR	596	590	560	595	689	784

S O U R C E : Calculations based on data from Census of India, U.P. Provincial *Tables for various censuses.*

* The densities of the tahsils and the district of Saharanpur for 1901 are calculated on the basis of the areas taken from the District Gazetteer of Saharanpur, 1903. These areas are exclusive of the submontane portions of the tahsils and therefore the directions for 1901 are unusually high.

By inference it may be said that in relative terms these border tahsils were rather areas of diffusion and the relatively well placed tahsils of the interior or of high urban development were the areas of concentration. As has already been noted in earlier chapters the main cause of high increas of population in certain tahsils during the last two decades of the half century was the abnormal growth of urban population it may be seen from these density maps that the relatively less diversified distribution of density of 1901 became considerably diversified and uneven by 1951. From this it may be inferred that a probable equilibrium in the man-land ratio that might have existed in 1901 was badly shattered at the turn of the half century by uneven growth in density of population.

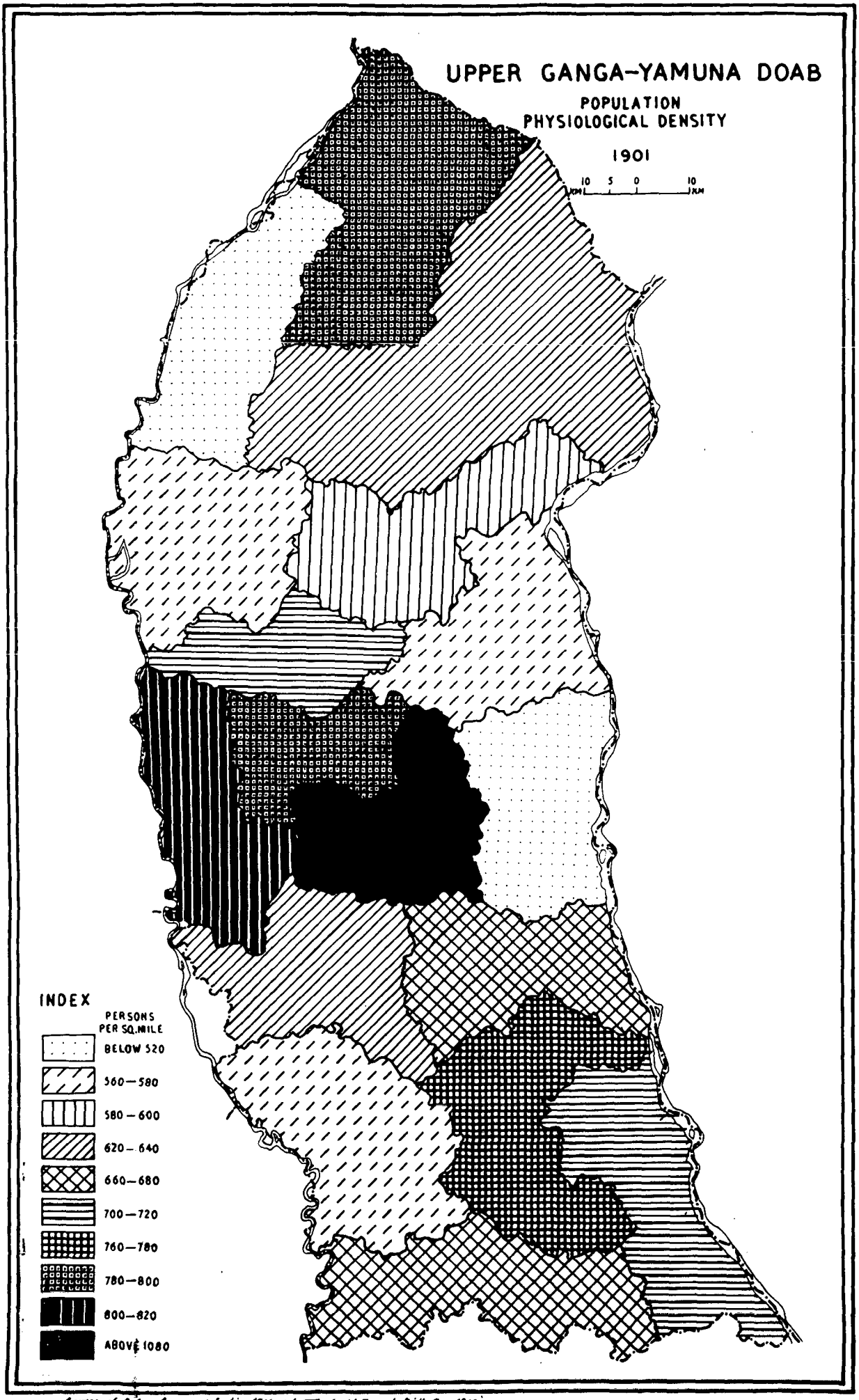
PHYSIOLOGICAL DENSITY

The simple arithmetic densities, as given above, are not, however, of much practical value. The mere fact that the man-land ratio in one region is one third of that in another region does not necessarily mean that the people in the latter are three times as prosperous as people in the former region. More important of course is the fact that whether there is adequate acreage of land available which could produce sufficient food or provide other means of livelihood. This could be obtained by considering the arable area which excludes the areas which are either topographically unfit for productive use or are permanent waste or are covered with water or are under sites, roads or buildings etc. The index of man-land ratio calculated by dividing the total arable area by the total population will show the physiological density from which a more meaningful assessment of the man-land ratio may be obtained.

Table CXLII and Figs.83 and 84 give the distribution of physiological density by tahsils for 1901 and 1951. The physiological density for Upper Doab as a whole was about 672 and 926 persons per square mile in 1901 and 1951 respectively. The comparison of arithmetical and physiological densities shows that there was but little difference between the two as the percentage of arable area to the total area has always been very high being as much as about 84.0 and 85.4 in 1901 and 1951 respectively. It is an unfortunate fact that whereas the population recorded an increase of about 38 per cent during the fifty years the arable land showed a nominal increase of about 1.4 per cent on the total land area. Infact this increase of percentage was more due to a reduction in the total area of the region than to any substantial increase in the arable land. According to 1951 assessment the arable area gained by 7,731 acres or 0.2 per cent of the 1901 total of arable land.

The physiological areality that is the average arable area available per capita was about 0.95 acres in 1901 and about 0.69 acres in 1951. Both the physiological density and areality indicate a substantial reduction in the land-man ratio during the fifty years. The reduction works to about 27.4 per cent of the 1901 ratio. This clearly indicates the enormous magnitude of the increasing pressure of population on land in the Upper Doab region.

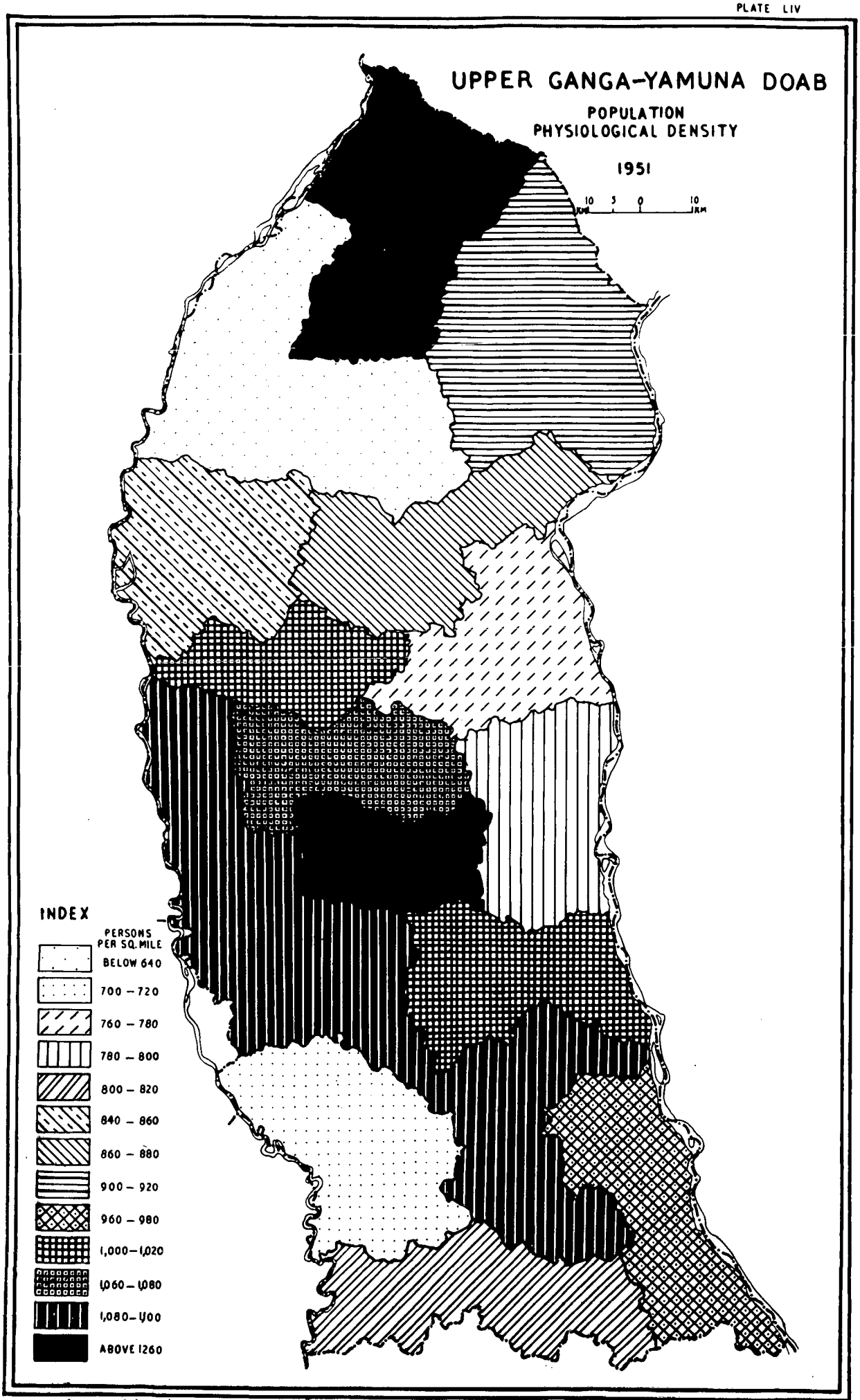
The regional pattern of distribution and variation of physiological density as depicted in Figs.83 and 84 was very much similar to that of the arithmetic density shown in Figs.77-82 and of the variation of



Source of Data: Census of India 1901, vol. XXI-A, pt.II and Distt Gaz. 1903

FIG. 83

PLATE LIV



Source of Data: Distt. Census Handbooks 1951

FIG. 84

TABLE **CXLVII**

TAHSIL-WISE DISTRIBUTION OF PHYSIOLOGICAL DENSITY AND AREALITY IN 1901 AND 1951

Tahsil	Physiological density (per square mile)		Physiological Areality (Acres per 100 persons)	
	1901	1951	1901	1951
1	2	3	4	5
Deoband	621.3	638.05	103	100
Roorkee	622.3	915.09	103	70
Nakur	533.1	616.05	120	104
Saharanpur	795.2	1260.00	80	51
DISTRICT SAHARANPUR	646.4	831.02	99	77
Budhana	718.7	1020.06	89	63
Jansath	563.4	774.08	114	82
Kairana	578.1	858.04	111	74
Muzaffarnagar	592.1	878.02	108	73
DISTRICT MUZAFFARNAGAR	625.0	876.07	104	73
Baghpat	813.6	1100.00	78	58
Ghaziabad	639.3	1095.05	100	58
Hapur	661.7	1012.04	96	63
Meerut	1083.3	1266.09	59	50
Mawana	533.5	793.05	120	81
Sardhana	797.5	1060.08	80	60
DISTRICT MEERUT	744.2	1084.07	86	59
Bulandshahr	769.4	1085.00	83	59
Anupshahr	720.3	963.07	89	66
Khurja	679.3	811.07	94	79
Sikandarabad	570.6	705.01	112	91
DISTRICT BULANDSHAHR	673.7	888.08	95	72

S O U R C E : Calculations based on data from:
(i) Census of India 1901, Vol.XVI-A Part II;
(ii) District Gazetteer of the various districts
(iii) District Census Handbooks 1951. Miscellaneous Statistics.

General population as brought out by Fig.23. It will be seen from Figs. that the central and western tahsils of Meerut district which formed the nucleus of high physiological density in 1901 expanded towards south and south-east in 1951 to include the southern tahsils of Meerut district and the sadar tahsil of Bulandshahr district. The Saharanpur tahsil which was a solitary tahsil of high density in the northern part of the region in 1901 retained its relative character in 1951 too. On the whole it will be noted that the basic pattern of 1901 has not changed materally during the fifty-year period of 1901 to 1951.

AGRICULTURAL DENSITY

The number of cultivators per unit of arable land provides a more specific index of man-land ratio. The agricultural density which signifies the figure for the agricultural population per unit of arable land may be obtained in different forms according to the meaning of the terms used and the nature of the data available.[1]

In the case of Upper Doab the agricultural density is obtained by dividing the agricultural population (excluding the non-cultivating owners of land and their dependents) by the total arable land. The agricultural population is not confined to active workers alone but includes the earning and non-earning dependents also. This was but inescapable because detailed tahsil-wise data for active workers is not available for the districts of Upper Doab.

As it may be appreciated, the agricultural density thus obtained can only serve as a crude index[2] of the pressure of population on land and of the

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1. Ferenczi, I., The Synthetic Optimum of Population, International Institute of Intellectual Co-operation, League of Nations, Paris, 1938, pp.28 et seq.

2. ibid, p.29.

relative state of overpopulation for two reasons: Firstly, in such an index no allowance is made for the relative agricultural productivity of the land; and secondly, in a highly agricultural region like Upper Doab quite a substantial proportion of the non-agricultural population also depends upon the local agricultural produce for the supply of the commodities of principal needs as well as the means of livelihood.

Due to the nature of information and data available no allowance for relative agricultural productivity in the tahsils or districts of Upper Doab is possible in the calculation of the index of agricultural density.

An assessment of the population pressure on agriculture may be made by obtaining indices of general agricultural areality[3] which is defined to signify the area of cultivated land available per head of the total population. This areality index, though crude, may show the extent of the total burden on the cultivated soil or the amount of the cultivated land which is available to sustain an average member of the population.

From table CXLIII(V) it will be seen that the agricultural density in Upper Doab was very high. Among the tahsils of the region the agricultural density in 1951 varied between 325 and 674 persons of agricultural population per square mile of arable land./ (Figs). This means that even the lowest density of 325 persons was more than three times the highest density that was obtained in a European country, namely 98 persons in Bulgaria, at the beginning of the fourth

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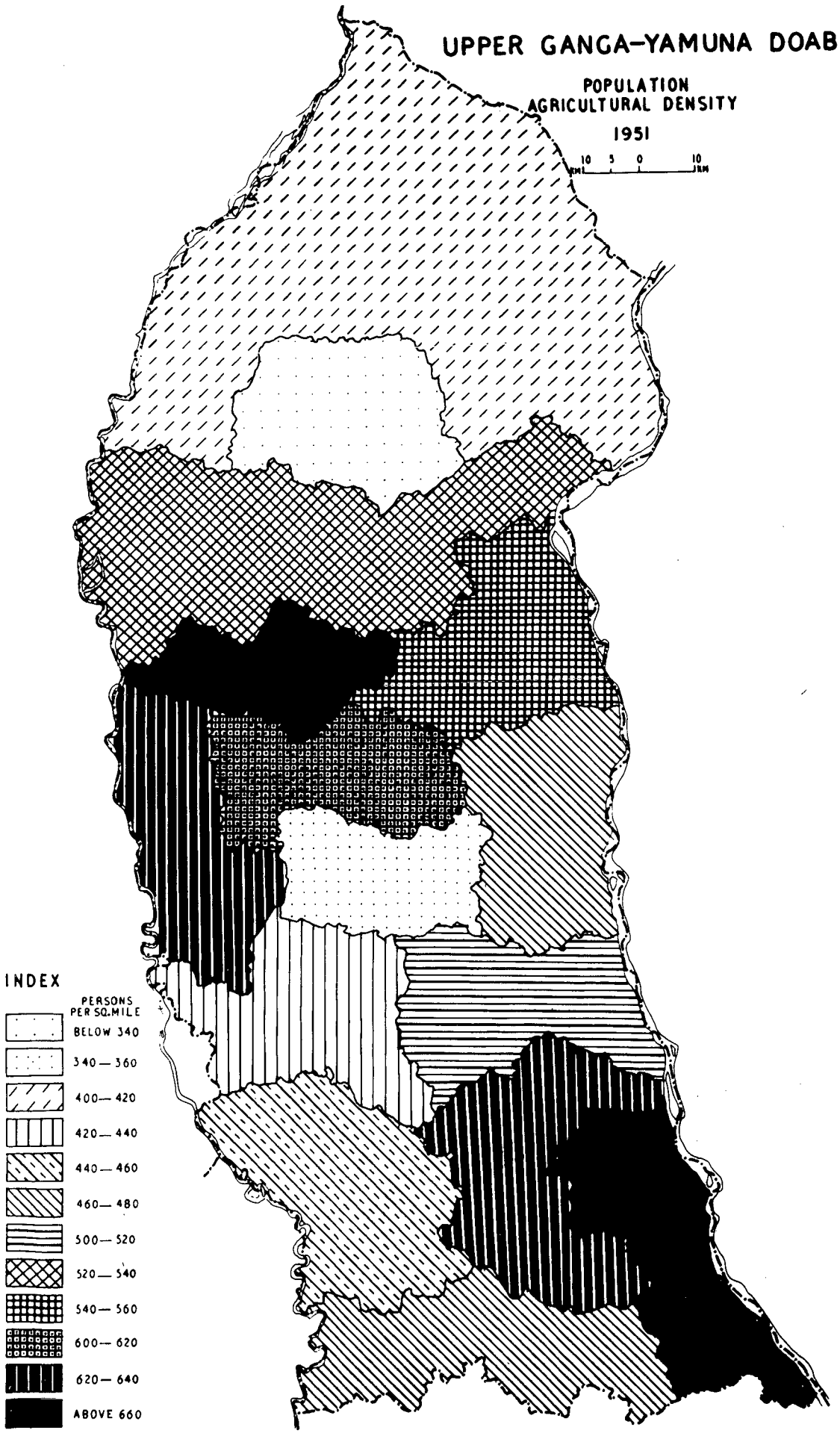
3. In a territory which is highly and classically agricultural like the Upper Doab region where there is not much difference between the arable and actually cultivated areas it seems that a more factual index of population pressure on agricultural land may be obtained by considering the total population and the total cultivated area in stead of agricul--tural population and arable land. The index of density or areality so obtained will be technically different from that of physiological density or areality which is calculated on the basis of total popula--tion and total arable land. In the opinion of the author the concept of the ratio between man and cultivated land may be succinctly conveyed by the term ' general agricultural areality ' and hence the use of the term for which no authority of precedence is claimed.

TABLE CXLVIII

TAHSIL-WISE DISTRIBUTION OF AGRICULTURAL DENSITY, 1951

Tahsil	Agricultural density per square mile
1	2
Deoband	325.5
Roorkee	408.7
Nakur	414.1
Saharanpur	407.9
DISTRICT SAHARANPUR	388.5
Budhana	673.5
Jansath	545.6
Kairana	538.3
Muzaffarnagar	531.8
DISTRICT MUZAFFARNAGAR	563.3
Baghpat	632.2
Ghaziabad	434.7
Hapur	515.2
Meerut	356.0
Mawana	462.6
Sardhana	602.4
DISTRICT MEERUT	494.0
Bulandshahr	624.2
Anupshahr	670.0
Khurja	456.1
Sikandarabad	466.3
DISTRICT BULANDSHAHR	520.3

S O U R C E : Calculations based on data from District Census Handbooks 1951.
NOTE: Agricultural density is calculated by dividing the persons with I,II and III means of agricultural livelihood and their dependents by the total arable area.



Source of Data: Distt. Census Handbooks 1951

FIG. 85

decade.[4] However this comparison is to be considered with certain qualifica-tions as Reithinger who has calculated the agricultural densities for European countries has not indicated as to what he has meant by " cultivated surface " and the " agricultural population."[5] Nevertheless it is very evident from the density indices given in table CXLIII that the pressure of agricultural population on arable land was tremendous. As the arable land defines the limit of areal extension of cultivation the pressure on agricultural resources is bound to increase unless either the population stops to grow or the agricultural population is diverted to non-agrarian productive occupations. The first alternative is almost impossible to achieve as the population of the region has not only been steadily increasing since 1931 but it was, according to Sundbarg's critereon, highly progressive even in 1951. The second alternative is not only promising but badly needed as the agriculture in Upper Doab was highly over-manned in 1951 even by the most modest standards. What seems to be badly needed is the widely diffused development of such non-agricultural means of production which may on the one hand absorb the surplus agricultural population and on the other hand provide agriculture with all possible aid and assistance for increasing the productive efficiency of both the farm and the farmer. The situation in Upper Doab in 1951 seemed to be much more alarming than that which was cautioned by Ferenczi to be existing in either Poland or Hungary during the fourth decade. According to his assessment Poland, because of the second highest agricultural density among the countries of Europe and due to lack of capital, insufficient occupational training, very limited scope of development of and employment in the industries etc., faced a situation which resulted in " a growing under-

4. Ferenczi, I., op.cit. p.28.
5. Reithinger, A., Das Vertsehaftlicge Gesicht Europas, Berlin, 1936, pp.22 ff. quoted by Ferenczi, I., op.cit. p.28.

-nourishment of the agricultural population, which is menacing the physical qualities of the Polish people."[6]

All these symptoms of disrupted agricultural economy were very acutely present in Upper Doab in 1951 and are most likely to become more accentuated and aggravated in the decades to come. If the past trends are any indication for the future the apprehension for further deterioration in the agricultural situation is but real. During the fifty years from 1901 to 1951 the arable area has remained almost unchanged: In 1901 it was assessed at about 4,381,744 acres whereas in 1951 it was found to be about 4,389,475 acres. Thus the arable area had an increase of only about 7,731 acres or less than 0.2 per cent of the 1901 acreage against an increase of about 31.9 per cent in the rural population of the region. On an average therefore the agricultural density in Upper Doab as a whole has increased from about 450 persons per square mile of arable land in 1901 to about 500 persons per square mile of arable land in 1951. On a crude average it signifies an annual increase of one person per square mile with an increase of about 0.64 per cent per year in the rural population. The tremendous consequences of this relative dynamism may be atonce appreciated when it is realized that the arable area shall remain constantly unchanged.

The enormous magnitude of the population pressure on agricultural land and the trend of variation thereof may also be appreciated by the examination of general agricultural areality indices. The intercensal variation of general agricultural areality in each pargana, tahsil and district of Upper Doab from 1901 to 1951 is given in tables CXLIX, CL, CLI, and CLII. From these tables it will be seen that the areality has suffered considerable

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6. Ferenczi, I., op cit. p.30.

TABLE CXLIX

PARGANA-WISE DISTRIBUTION OF GENERAL AGRICULTURAL AREALITY IN DISTRICT SAHARANPUR FOR 1901 AND 1951

Pargana	Agricultural areality in acres per 100 persons	
	1901	1951
1	2	3
Deoband	88.5	69.0
Rampur	83.5	73.9
Nagal	104.2	85.8
Nakur	94.4	84.8
Sultanpur	86.2	84.4
Sarsawa	109.0	102.2
Gangoh	90.8	73.2
Manglore	76.9	60.0
Jawalapur	76.0	44.7
Bhagwanpur	100.00	82.0
Roorkee	80.4	52.6
Muzaffarabad	97.0	78.6
Faizabad	96.9	84.5
Haraura	88.1	78.4
Saharanpur	41.8	27.2

S O U R C E : Calculations based on data from District Gazetteer Saharanpur, 1903 and District Census Handbook 1951.

TABLE C.L

PARGANA-WISE DISTRIBUTION OF GENERAL AGRICULTURAL AREALITY IN DISTRICT MUZAFFARNAGAR FOR 1901 AND 1951

Pargana	Agricultural areality in acres per 100 persons	
	1901	1951
1	2	3
Muzaffarnagar	73.4	41.1
Baghra	82.5	60.5
Chartawal	105.0	76.3
Purchhapur	98.5	82.4
Gordhanpur	118.5	122.0
Shamli	72.8	49.4
Kairana	62.7	62.7
Thana Bhawan	79.7	65.7
Jhinjhana	80.4	69.3
Bidauli	104.1	112.1
Khatauli	76.2	56.7
Bhuma Sambalhera	97.8	82.0
J. Jansath	98.6	79.5
Bhukerheri	96.2	77.0
Budhana	74.6	67.5
Shikarpur	76.4	60.5
Kandhla	70.0	52.4

S O U R C E : Calculations based on data from District Gazetteer Muzaffarnagar and District Census Handbook 1951.

TABLE CLI

PARGANA-WISE DISTRIBUTION OF GENERAL AGRICULTURAL AREALITY IN DISTRICT MEERUT FOR 1901 AND 1951

Pargana	Agricultural areality in acres per 100 persons	
	1901	1951
1	2	3
Loni	82.6	46.6
Jalalabad	75.4	52.1
Dasna	74.0	55.3
Hastinapur	84.0	64.8
Kithore	87.7	62.3
Sardhana	68.7	59.5
Barnawa	69.5	60.0
Baghpat	76.3	62.0
Baraut	62.0	38.8
Kutana	65.7	59.5
Chaprauli	66.7	50.6
Hapur	77.3	51.3
Sardhana	95.2	69.9
Garhmuktesar	64.0	62.0
Puth	86.7	69.6
Meerut	51.0	27.0

S O U R C E : Calculations based on data from District Gazetteer Meerut 1901 and District Census Handbook 1951.

TABLE C.LII

PARGANA-WISE DISTRIBUTION OF GENERAL AGRICULTURAL AREALITY IN DISTRICT BULANDSHAHR FOR 1901 AND 1951

Pargana	Agricultural areality in acres per 100 persons	
	1901	1951
1	2	3
Ahar	83.3	61.6
Dibai	76.8	59.0
Anupshahr	69.5	53.1
Agauta	68.1	52.4
Baran	62.5	44.2
Siyana	81.1	61.7
Shikarpur	80.0	67.8
Dadri	96.8	80.4
Dankaur	94.5	88.2
Sikandarabad	72.6	56.7
Khurja	72.4	56.3
Jewar	102.0	81.5
Pahasu	76.7	66.9

S O U R C E : Calculations based on data from District Gazetteer Bulandshahr 1901 and District Census Handbook 1951.

reduction in all the parganas and tahsils of the region. In 1901 the average areality in Upper Doab was about 0.939 acres of cultivated land per head of the total population but in 1951 it reduced to about 0.692 acres per head or in other words the share of cultivated land of every man, woman, and child was cut down by about 0.247 acres or about 24.7 per cent of the share in 1901 That the areality indices have been a direct function of the population numbers is clearly emphasized by the fact that the areality indices were generally highest in 1911 which was the year of universal decline of population. In ~~this~~ that year there were only three tahsils (Baghpat, Meerut, and Bulandshahr) which had an areality of less than one acre otherwise in all the remaining fifteen tahsils the areality was more than one acre. In contrast to this in 1951 there were only two tahsils (Deoband and Nakur) which had an areality exceeding one acre while in the remaining sixteen tahsils it was less than one acre. This evidently establishes the fact that the pressure of population on cultivated land has been steadily increasing in direct proportion with the growth of population and despite all that has been done for the improvement of agriculture the cultivation has badly failed to keep pace with the growing population.

PART III

CONCLUSION

CHAPTER XII

CONCLUSION

Population Growth

The foregoing analysis of various aspects of the dynamism and structure of the population of Upper Doab has revealed some noteworthy relations between the growth of population and the development of economic resources which are primarily and predominantly agricultural in this region. Whatever the controversies excited by Malthus' theories regarding the question of population growth and economic growth and whatever reluctance exercised in the acceptance of his views, Malthus seems to score a point with regard to relative rate of population growth and food production in Upper Doab region. His view that ' population growth will exceed the rate at which food production will grow is fully substantiated by the respective differential rates of growth in this part of western U.P. May be that this Malthusian tanet does not seem to hold as good in a global perspective: The carrying capacity of the world has been growing all the time due to reclamation of new lands and application of new techniques of agriculture to the old ones. Yield-rates in the majority of the progressive countries have gone up within a range of 0.7 per cent to 1.5 per cent per annum while according to the best estimates available the population of the world in the half century or so before the first world war was growing at a rate of about 0.7 per cent per annum[1] and increased in the first fifty years of the 20th century at a cumulative rate of 0.98 per cent per annum. The total population of the world in 1951 was

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1. Lewis, W.A., ' The Theory of Economic Growth', 1956, p.308.

was about 2494[2] million and with current agricultural techniques this population may get adequate diet of European level.[3]

Incidentally the average annual rate of population growth in the first half of the twentieth century in Upper Doab was very close to world average of 50 years before world war I as it worked to be about 0.76 per cent per annum (vide table XV.) but the increase in cultivated area was far short of this index as it worked to about 3.2 per cent while the yield-rates on the whole remained somewhat stationary. This shows a definite lag in the growth of agriculture vis-a-vis population growth in the region during the period 1901 to 1951 and substantiates the above quoted view of Malthus.

Malthus' third postulate that the growth of population is always checked by the limitation of the means of subsistence is rather nullified by the behaviour of population variation in Upper Doab. Despite some decline in cultivated area per capita and certain yields per acre the population has steadily been increasing since 1921. It seems quite certain that population is more directly controlled by factors affecting or determining birth and death-rates rather than simply by food raising capacity of the soil of the region.

Birth-Rate

Birth-rates are primarily a function of the social attitude of the people, the sex-ratio in a population and efficiency of health and hygienic services. The custom of early marriages especially among the rural communities is still fairly common in the region though recently it has begu

2. United Nations Demographic Year-Book, 1959.
3. Lewis, W.A., op.cit., p.308.

to show signs of improvement. The peasants are not agreeable to birth control measures and as such the early marriage assumes great importance in the dynamism of Upper Doab's population numbers, since it is a well known fact that the fertility falls with age. The retention of an average birth-rate around 39 per mille per annum (vide tables XLII and XLIII) during the last thirty years has been made possible chiefly by the custom of young age marriages. This point is now catching attention of the demographic and social, and economic planners and it is gratifying to note that prospects of success are relatively bright in the compaign of raising marriage age than in that of birth control and family planning. From the vital statistics set out in table LI it may be seen that there has been substantial decline in the rural birth-rate during the decennium 1941-50 during which period the urban birth-rate was considerably high.

Though this reduction in rural birth-rate may to some extent be attributed to a check on early marriages but the unusual behaviour of rural urban differential of birth-rates cannot satisfactorily be explained without invoking factors of health services and male female ratios. It has been noted in connection with the three phased growth of population that from after 1921 hospital services were increasingly made available in cities and towns so that a considerable number of women from villages used to come to city or town hospitals for delivery. According to an approximate estimation of Rajeshwari Parsad about one-fourth of the deliveries in 1951 which took place in the city hospitals of U.P. were of women who were inhabitants of rural areas. Such births were recorded in

the city registers of birth and tended to reduce the rural births and inflate the urban birth-rates.

In the chapter on sex structure of the population it has been pointed out that in Upper Doab the females were in defect of males and that the female deficiency was comparatively greater in the population of towns and cities than in the rural population. For about two decades before 1950 there has been considerable migration from villages to cities. The emigrants have generally been males belonging to working age groups. This tended to increase the masculinity of urban population. The rural emigrants would, however, generally prefer to marry girls of their caste and family. Some of these married girls shift to the towns to live with their husbands for some time and thus a good number of females of child bearing age are drawn into cities or towns from the villages and the urban birth-rates are consequently augmented at the expense of rural ones. The urban rural disparity in sex ratio is set out in table XC and it may be seen from the table that for every thousand males in 1951 there were fifty females more in the rural population as compared to the urban population. This indicates that the female migrations have generally been temporary and for short periods but nevertheless they have tended to increase substantially the rate of births in towns.

This leads to the conclusion that the apparent fall in rural birth-rates could not bring about a proportionate retardation in the growth of general population as the reduction was rather apparent than real and it was materially offset by a relative inflation in the urban birth-rates.

Death-Rate

On the other hand the death-rates in all the districts of the region have steadly declined especially after the year 1921. The death-rate tends to fall because of three sets of factors. First it may fall because of improvements in food supply due either to increase in cultivated area and yield per acre or to efficient procurement and better distribution. In the case of Upper Doab this factor has been of no significance since the analysis of the agricultural situation (Chapt.X) shows that there has rather been a relative deterioration in respect of production and cultivation. The communication which play a very important role in the distribution of food supplies have seen no appreciable improvement during the last two decades or so of the half century. Besides it may also be appreciated that Upper Doab as a whole is one of the most fertile tracts of the State and a better communication system may be as much an asset as a liability. Improved communications may ensure inflow of food supplies as much as they may facilitate or even encourage outflow of the local food production.

Second and third sets of factors relate to improvement in medical services. These services operate at two levels. One of these is the adoption of preventive and immunological measures on a national or public service basis, which may eradicate epidemics. The other is the widespread extension of medical services and facilities to private persons. In Upper Doab region the public health stage of preventive measures was reached in the twenties and fully developed in the thirties. As a result of this the devastating epidemic diseases such as plague, cholera, typhoid

fever, smallpox and malaria were either completely wiped out or effectively controlled. A detailed survey of this state has been made in chapter V on the phased growth of population and from tableXLIIIit may be seen that by 1940 the mean decennial death-rate in Upper Doab as a whole was reduced by about 10 per cent of what it was in the decade 1921-30. After 1940 the second stage of the extension of curative medicines was also reached and considerable reduction in the mean death-rate occurred so that by 1950 the mean decennial death-rate was put down by almost 33 per cent of the rate during 1921-30.

Age Structure

The study of the age structure shows high progressiveness of Upper Doab population. The high proportion of under-fifteens amounting to 38 per cent of the total population indicates the enormous reservoir of reproductive numbers all of which (barring the random casualties) will be actively reproducing after two decades i.e., by 1970. If the death and birth-rates remain what they were in 1951 the population of the region seems destined to enter the stage of population explosion.

Besides accelerating the rate of growth the broad based age structure has also resulted in high burden of juvenile dependency which is constantly straining the economyof the region. Since the birth-rate is high, survival expectancy has increased and the number of productive members is increasing every year huge capital resources would be required recurringly for proper feeding and welfare of children and the economic development plans shall continue to depend increasingly on foreign aid for their implementation.

The broad base and fast atennuating top indicate that the number of persons who attain working age every year is much greater than those who complete their working lives. For instance in 1951 in Upper Doab the number of persons of 14 years and 59 years age was about 154,000 and 12,600 respectively. Barring casualties it may be seen that in 1952 the addition to working force would be almost twelve times more than those who will move out of the force. On an average the yearly addition to the working force will be 8 to 10 times of the subtraction from it. New avenues of gainful occupa-tion have, therefore, to be found for the surging working force otherwise the economy shall run the risk of suffering from the maladies of the unemploy-yed delinquency and increased burden of dependency.

Sex-Ratio

The population of Upper Doab is conspicuously masculine. The ratio of 841 females per thousand males for the region in 1951 contrasted sharply with the corresponding world average of 992 and also with the Indian and U.P. averages of 947 and 910 respectively. The female deficiency has been rather progressive. From 878 in 1901 the female ratio declined to 841 in 1951. Thi indicates that the working force in this part of U.P. is higher than what it would have been in the case of an even distribution of males and females. Theoretically chances of marriage for males within the region are proport-ionally less and as such the high female deficiency may bring about matrimo-nial feminal immigration and may ~~suggest~~ augment the rate of population growth both natural as well as absolute.

Rural-Urban Structure

From 1921 urban population of Upper Doab has been increasing at a faster rate than either the general population or the rural population. Rapid growth of towns has brought about considerable migration into the region and besides being the main cause of female deficiency the steady urbanization has also been a direct factor in the rapid growth of population of the area.

Despite the decline during the first two decades the urban population increased by almost sixty-nine per cent in fifty years from 1901 to 1951. The increase in the last three decades of the half-century was still higher being a little over eighty per cent of 1921 population. The indices of grow in the general and rural population for the corresponding periods, on the other hand, were only about thirty-eight and forty-eight and thirty-two and forty per cent respectively. This shows the rapid urbanization that has taken place in the region during the fifty years and especially during the last three decades from 1921 to 1951.

The increase in the population of class I and II towns has been exceptionally high. Between 1901 and 1951 the population of class I towns recorded a tremendous increase of about 223 per cent on 1901 population. The towns of class II followed with an increase of over 83 per cent while th population of class V and VI towns declined by about 9 per cent each.

The increase in urban population was chiefly due to immigration rather than to an abnormally high rate of natural growth. Though in the total urban population the natural growth rate overtook the rate of growth

due to immigration during 1941-51, immigration still continued to be the most predominant cause of population growth in the chief cities of Upper Doab: in 1951 the balance of immigrants in big cities was 36.7 per cent against the natural growth index of 3.8 per cent.

The occupational analysis of the urban population shows that in the majority of towns the agricultural means of livelihood were among the principa occupations of the people. Commerce and industry were insignificant and confined to the five cities and a few towns of the region. The combinational analysis of urban occupations reveals a dominant agrarian orientation and an absence of specialization in urban functions. The requisite services of commerce, transport, industry and agricultural management which should be forthcoming from urban centres have not been available at these centres and the agriculture of the region was badly suffering from lack of co-ordi--nation and supplementation between the rural and urban economies. The over-strained and over-manned character of agriculture, brought about by rapid growth of general population and ruralization of urban occupations, was a serious manace and calls for diversion of population to cottage and other small scale industries anciliary to agriculture so that the progressive disequilibrium in the economy of Upper Doab may be effectively checked and redressed.

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It may, therefore, be seen that by 1951 a stage has been reached wherein the relative position of birth and death-rates, the peculiar pattern of age structure and sex ratio and the ever increasing rate of urbanization

all seem to have set for tremendous increase in the general population of Upper Doab in the years to come. On a modest estimation it may be expected that Upper Doab's population may increase to about 7.5 million in 1961 and to almost 9 million in 1971 and might become nearly double of 1951 population by the year 1981.

* * *

Distribution:

The regional distribution of population and its growth has been intimately related to the agricultural situation and public health conditions in the various parts of the region. The growth rates and density of population have been generally higher in the bangar tracts of comparatively great agricultural prosperity. In the khadir and bhur tracts of relatively precarious agriculture the growth and density have been rather low. This relation between population and agriculture was more pronounced in the earlier decades. In the later decades factors of health and urbanization assumed greater significance and over shadowed the direct influence of agriculture. This brought about some modification in the pattern of distribution of growth, density and structure of population:

There has been comparatively high increase of density and growth of population in those parts of Upper Doab which contained many urban centres of fairly big size. The highest indices of growth and density in Meerut tahsil in particular and the district in general have been obtained primarily because of the large number and size of towns. Within each district, too,

the regional distribution of various aspects of population has generally varied according to the magnitude of urbanization.

However, the progressive urbanization, which in the later decades played an important role in the growth and distribution of population was, to a considerable extent related to the regional variations in agricultural prosperity. Generally towns were more numerous, relatively big in size and more rapidly growing in agriculturally prosperous areas whereas they were fewer in number and smaller in size and grew rather slowly (some of them even declined) in areas of precarious agriculture. Thus in spite of the apparently significant and direct role of urbanization the agricultural factor was of fundamental and basic importance in conditioning the pattern of regional distribution. The pattern of distribution that had developed by the close of the 19th century remained basically unchanged by the middle of the 20th century and the rapid urbanization of the later decades did nothing more than accentuate the regional contrasts in various aspects of the population which had developed in the region in accordance with the agricultural situation at the beginning of the century.

Occupational Structure

Agriculture has certainly been the main occupation of the people in Upper Doab. Though in 1951 the proportion of the population dependent on agriculture in the region was substantially below the State average it was, nevertheless, considerably high as more than half of the population depended solely on agriculture for its livelihood.

A noteworthy point in connection with the dependence on agriculture was a steady increase in the proportion of the population driving its livelihood from agrarian occupations during the fifty years from 1901 to 1951. In 1901 about 46.7 per cent or less than half of the population depended on agriculture but by 1951 the proportion increased to 54.7 per cent. This obviously meant an increase of about 8 per cent relative to the 1901 position. But during these fifty years the general population of the region increased by about 38 per cent of the 1901 total and as such the actual increase in the number of dependents on agricultural occupations was much greater than does the small percentage of 8 indicate.

In the absence of widespread development of small scale agrarian industries the agriculture of the region has clearly been under heavy pressure of ever increasing population. The steady growth of the population and the number of persons engaged in agricultural occupations seriously calls for measures of widening the opportunities of the secondary occupa--tions which may also be of direct service to the improvement of agricultura efficiency and production.

Secondary occupations have, infact, been an important factor of the agrarian economy of Upper Doab and if, properly developed and organized, they are bound to make significant contribution to the rural economy of the region because of the seasonal character of most of the agricultural occupations and steady increase in agricultural population. Unfortunately the position of the secondary means of livelihood in 1951 was far from being satisfactory. Among the self-supporting persons of all agricultural classes only 8.77 per cent had a secondary occupation. Out of this

proportion (8.77 per cent) 2.54 per cent were engaged in agricultural secondaries and 6.23 per cent were occupied in non-agricultural ones. Among the earning dependents, on the other hand, an overwhelming majority (about 70 per cent)returned agricultural secondaries; the non-agricultural secondaries accounted for about 30 per cent of the earning dependents. This shows the predominance of agricultural occupations even in the secondary means of livelihood and indicates the imbalance between the agricultural and non-agricultural opportunities available in the rural areas. It appears that the saturation point in the absorption by the agricultural secondaries must have been reached and as such provision for greater and varied opportunities of industrial and commercial occupations was imminently needed.

The occupational analysis of the non-cultivating owners of land and agricultural rent receivers shows that this class of agriculturists has taken some lead in the direction of diversification of secondary occupations. Among the 16.1 per cent of the self-supporting persons who pursued a secondary means of livelihood 11.92 per cent were engaged in non-agricultural subsidiaries and only 4.18 per cent in the agricultural ones. The proportion of the non-agricultural secondaries was thus 74 per cent of the self-supporting persons having a secondary means of livelihood. Among the earning dependents, too, the non-agricultural secondaries were more popular and accounted for 55.51 per cent of the total. This diversification, however,could not ~~structure~~ bring about any appreciable effect on the overall position of the agricultural occupations as the proportion of the non-cultivating owners of land and agricultural

rent receivers was only about one per cent of all the agricultural classes

Thus the pressure and burden of dependency on agricultural means of livelihood was considerably high. In Upper Doab as a whole only 30.5 per cent of the agriculturists were self-supporting and a paltry 3.8 per cent were earning dependents. The burden of non-earning dependents was consequently as high as 65.7 per cent of all the agricultural classes which constituted 54.7 per cent of the total population of the region.

Non-Agricultural Occupations

The proportion of persons depending on non-agricultural means of livelihood in Upper Doab was 45.3 per cent in 1951. This was definitely the highest in the State of Uttar Pradesh as shown by table CXXVI. In rural population, too, the region had the distinction of having the highest proportion, i.e., about 34.0 per cent, engaged in the non-agricultural occupations in the State. But the proportion of the urban population with non agrarian occupations was even lesser than the State average. It may, therefore, be seen that the rural population of the region was most urbanized in respect of occupational structure and urban population was the second most ruralized in the State.

This was in one way an advantage which Upper Doab had over other parts of Uttar Pradesh. The high urbanity of rural occupations has tended to make the economy of the region more balanced than that of any other par

of U.P.

Nevertheless the proportion of 34 per cent in itself was not a very high percentage. Moreover the effectiveness of this proportion of rural population in the general economy was much reduced by the high preponderance of miscellaneous services, which accounted for about 50 per cent of all non-agricultural classes, and the relative insignificance of industry and commerce, which had a share of about 37 and 9 per cent respectively.

The change in the proportion of non-agricultural population during 1901-51 varied considerably from district to district. The proportion declined progressively and steadily in districts Muzaffarnagar and Bulandshahr. The decline in Saharanpur district was only nominal. In Meerut district, on the contrary, the proportion of non-agricultural population increased by about 3 per cent. On the whole, therefore, the non-agricultural proportion in Upper Doab population suffered a loss of about 4.6 per cent.

The most unfortunate feature, however, was that alongside with the decrease of the non-agricultural workers the proportion of non-earning dependents went up in every district. This resulted in an increase in the burden of dependency and adversely affected the economy of the region.

Among the self-supporting persons there was an overwhelming prepond--erance of independent workers in the rural areas but in the urban areas their proportion was only slightly higher than the proportion of the employees and the employers. This contrast was due mainly to the fact tha organized industries and trade were located mostly in the urban areas;

the rural areas on the contrary were conspicuous for the absence of organized establishments of non-agricultural occupations.

Progress of Agriculture

The progress of agriculture was not in the least comparable with the growth of population. Due to an increase of about 38.2 per cent amounting to an addition of 1,755,811 persons to the Upper Doab population in a period of fifty years the cultivated area per capita shrinked to about half acre (or 0.58 acres to be precise). Thus in fifty years the percental decline in the cultivated area per capita was as high as 25.6 of the percapita acreage in 1901 which was 0.78 acres. This shows that the burden of populatic on agricultural resources has increased considerably within the half-century period.

From the examination of the percentage of total land area under cultivation in various districts it is impressed that the cultivation in all the districts has, by 1951, reached almost its fullest in areal exapansion leaving almost no possibility of any substantial or appreciably effective increase in cultivated area.

This situation in the face of fast multiplying population leaves no alternative but that the agriculture be supplemented and aided by non-agrarian enterprises so that the yield-rates may be increased, double cropping may be extended and the cultivation may be relieved from the evil of being over-manned.

The non-agricultural occupations, though accounted for fairly high percentage of the population, lacked much in organized and effective co-ordination with agriculture. The need for the establishment of industri of various description and denomination which may directly increase the efficiency of production and distribution of agricultural commodities was imminently felt at the turn of the half-century. A co-ordination between t agricultural and non-agricultural activities with the professed aim of improving the agricultural efficiency may not only ameliorate the over-mann state of cultivation by diverting people to means of production other than cultivation but would also help increase the yield-rates which by all probability have remained rather static.

The progress in double cropping has been fairly gratifying. The inde of progress in double cropped area has exceeded the index of population growth by almost one and a-half times during the period 1901-51. As the major increase was obtained only in a period of one decade i.e., 1941-51[4] it may be appreciated that there existed considerable scope of progress in double cropping which, if utilized fully and in a planned manner, may go a long way to counter the increasing pressure of the highly progressive population.

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4. The relatively high increase in double cropping during 1941-51 may be appreciated by comparing the percentages of increase between 1901 to 19 and 1901 to 1951 as tabulated below:

District	Increased in double cropped acreage				
	1901 to 1941		1941 to 1951		1901 to 1951
	Absolute	Percent	Absolute	Present	Percent
Saharanpur	5566	2.6	62,291	28.5	31.8
Muzaffarnagar	20111	14.9	75,251	48.7	70.8
Meerut	94322	42.4	91,723	29.0	83.7
Bulandshahr	74775	34.7	28,491	9.8	48.0
Upper Doab	194,774	24.8	257,756	26.3	57.6

A reduction of about four per cent in the acreage under foodcrops was a distressing feature of the variation of cropping pattern in Upper Doab. With some increase in yield-rates of certain foodcrops the region could obtain an increase of only about 7.8 per cent in the production of foodgrains during fifty years. Compared with the corresponding increase of about 38.2 per cent in general population the position of indigenous food supply has definitely deteriorated and consequently the per capita share of foodgrains has suffered a cut of little over hundred pounds per year. Thus despite some increase in certain yield-rates and substantial improvement in double cropping the position of availability of calories per adult has deteriorated from near-adequate level in 1901 to far below the level of adequacy in 1951 suffering a loss of no less than 650 calories per day.

Another malady of the agricultural situation was fragmentation and scattering of holdings. The increase of population has but only aggravated the evil consequences of this malady. The ever increasing number of co-sharers of the holdings has made the division and redivision of plots a perpetual feature of the agriculture of the region. Besides the wastage of land through demarcation of irregular boundaries, the recurring division has rendered majority of holdings uneconomical by even the most modest standard. The uneconomical size of holding was not simply uneconomical on the per capita basis but was also a great deterrent in the way of the application of modern techniques of cultivation for improving the agricultu-ral efficiency of the region. Impressed by the dilemma of progressive population and the incumbent shrinking of holdings the State government has taken the much needed step of the consolidation of holdings within the proposed limits of a minimum of 6.25 acres and a maximum of 30 acres.

How far does this step prove efficacious in remedying the chronic ills of the utilization of agricultural resources and helping the rate of agricultural production, especially the food commodities, keep pace with the growing numbers of population is difficult to foretell. But, nevertheless, the propriety and judiciousness of the step seems to be beyond doubt.

It is by no means intended to advocate for a subsistence or unequivocally self -sufficing agricultural economy for Upper Doab. The imports and exports are but indispensible in the modern economic growth and progress. It needs no saying that they should also develop even in the agricultural sector of Upper Doab economy. What is emphasized here is that the overall productivity index of land should be tried to be so raised as to be able to cope with the increasing pressure of population either directly or indirectly through imports and exports without ~~any~~ any jeopardy to the agriculture which is undoubtedly the very basis of the whole economy of the region.

The growing population has posed a grave challenge. The measures of birth control ultimately touch upon those delicate points of human life which are most privately personal and emotionally sensitive. The success of family planning basically depends upon individual persuation and response either of which is particularly difficult to achieve with a population of which the overwhelming majority is rural and illiterate as was the case in Upper Doab at the time of 1951 census. The growth of population is a biological reality and a natural process which can neither be ignored nor stopped. What a birth control drive can best achieve is a certain slackenin of the rate of multiplication but it seems most wishful and unconcievable

that it could ever be able to strike an absolute balance between the natural additions and substractions in a population so that it may stop growing and remain static. Under the natural law of genesis it, therefore, seems destined that the human population shall continue to grow though some control may possibly be obtained on the rate of its growth.

If a full control over the growth of population is unattainable the compaign of family planning as the main line of action is very much an effort in futility. The pursuit of the unattainable, through it may look the best, is evidently a waste of resource. This is particularly true of a region like Upper Doab where the general masses are the least, if they are at all, appreciative of the proclaimed benefits of birth control measures.

A more positive and surer answer to the posed challenge is to go all out for an increase in the output. The efforts for augmentation of production do not depend upon personal whims and most private attitudes of individuals for their success. The resources both material and intellectual spent on the achievement of the unattainable best—the ideal—may be more usefully diverted towards the efforts for improving the productive efficiency of both the people and the land which though not ideal is more realistic and practical.

In the special perspective of the population and agricultural situation in Upper Doab what seems to be really and most required is:

a) a balance between rural and urban population which was in a state of ~~destruction~~ *disruption* in 1951 due to highly abnormal growth of a few towns causing precipitous gap in the continuum of towns; this could possibly be done by encouraging the growth of medium and small size towns through the develop-ment of modest and small scale establishments of production other than

cultivation, and commerce and transport;

b) a purposeful co-ordination between the agricultural and non-agricultural means of livelihood, so that the latter may lend all possible help to improve the index of productivity of the former and relieve it from the malady of increasing coin and cash orientation and the state of being highly over-manned.

c) a rational planning of the agricultural use of land to augment the cultivation of the crops most suited to the character of land and to increase the acreage of double cropping to the fullest possible extent; a genuine and sincere implementation of the scheme of consolidation of holdings warding off the danger of deterioration of holdings into subeconomical size may be a significant aspect of landuse planning for the eradication of the ill effects of appallingly small agricultural areality in Upper Doab; and

d) an extension of the services of organized sale, procurement and banking facilities into the rural areas protecting the legitimate interests of both the agriculturist and the consumer of his produce.

It may, therefore, be hoped with sufficient reason, that if the compaign of cultivating a sense of national and civic responsibility, envisaged in family planning, among the general masses is supplemented, desirably on a preferential basis, with a drive for the implementation and introduction of above envisaged programmes and plans the impending danger of the disruptive effects of the progressive population on the basic economy of Upper Doab may be confidently averted.

APPENDIX I

Maps 44 - 49 are drawn on a slightly modified form of Sten de Geer's method. The modification introduced by the author is intended to distinguish the towns of small size from larger towns and cities. For this purpose towns with a population between 10,000 and 5,000 persons are shown by black circles and the towns with more than 10,000 persons are represented by sphere But this involves a technical difficulty of scales as the scales of spheres are volumetric whereas the scales of circles are areal. To overcome this difficulty the areal scales are inflated in the same ratio in which the volume of a sphere stands with the area of the circle. It is also possible to select two independent arbitrary scales for spheres and circles but in tha case the two symbols will not be comparable. In order to maintain strict comparability between spheres and circles the representative value of the radius of a circle is calculated mathematically in terms of the conveniently selected representative value of the radius of a sphere. The calculations are very simple as may be seen from the following:

Let r and R be the radii of spheres and circles respectively then the volume of the sphere and the area of the circle are expressed as $\frac{4}{3}\pi r^3$ and πR^2.

To find out the value of R so that the area of the circle may represent the same magnitude as that represented by the sphere the area is equated with the volume and R is determined in terms of r

$$\text{Thus } \pi R^2 = \frac{4}{3}\pi r^3$$

$$\text{Or } R^2 = \frac{4}{3} r^3$$

Taking the logs of the two sides we get

$\log R^2 = \log \frac{4}{3} r^3$

or $2 \log R = \log 4 - \log 3 + 3 \log r$.

Hence $\log R = \frac{1}{2} (\log 4 - \log 3) + \frac{3}{2} \log r$.

Since in the right side of the above equation the first factor of the binomial i.e. $\frac{1}{2} (\log 4 - \log 3)$ is a constant therefore the value of R varies only with the value of r. Thus for different values of r only the factor $3 \log r$ is to be computed and no repeated calculations for $\frac{1}{2} (\log 4 - \log 3)$ are required. It, therefore, shows that the representative value of the radius of a circle is to be augmented in the ratio given by the equation $\frac{\log R}{\frac{3 \log r}{2}} = \frac{1}{2} (\log 4 - \log 3)$.

For example the representative value of the radius of a circle corresponding to the selected value of 1" = 50 persons for the radius of a sphere will be had as

$\log R = \frac{1}{2} (\log 4 - \log 3 + 3 \log 50)$.

or $\log R = 2.6109243$.

or $R = 408.25$ persons.

This value of R may be selected as the scale for the circles and the radii of the circles for various towns may then be calculated.

The maps referred to above were originally drawn on these two scales namely 1" = 50 and 408.25 persons but they were photostatically reduced by half in linear scale and hence the scale values are doubled.

APPENDIX II

Map 53 is drawn on the method of population peaks employed by S.D. Dodge[1] in his analysis of population regions of New England with certain *modifications to suit the nature of the map and the data used. Since Dodge* has used this method for the general population of a bigger area he adopted four broad categories of growth namely a) continued growth, (b) decline of 25 per cent from a peak, (c) decline of 25-50 per cent from a peak, and (d) decline of over 50 per cent from a peak. These categories were determine for each administrative unit and appropriate choropleths were inserted to delineate the growth category regions.

In respect of map 53 under consideration it was not possible to use Dodge's method as it is because here city and town population instead of the general was dealt with. City and town population is obviously more localized and concentrated in its distribution so that general use of chropoleth technique is not admissible as in that case the resultant map will show the categorized growth of urban population instead of that of the cities and towns. Located rectangular diagram technique is, therefore, combined with that of chropleth. To make the map look simple and impressive and facile for comparative analysis the size of the rectangle representing a town or a city is arbitrarily selected to suit the scale of the map and the total number of towns to be shown therein. Each rectangle is then shaded according to the category and grade of category of the town or city which it stands for.

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1. *Dodge, S.D., A Study of Population Regions in New England on a New Basis,* Ann. of the Ass. of Am. Geog., Vol.25, 1935.

Since the period of fifty years is not long enough to justify the use of broader categories adopted by Dodge the decline category is subdivide into quinary grades in order to show in detail various degrees of irregulari in the decline of the population of towns and cities.

The years in which the population peaks were attained are indicated below the rectangles whereas the name of the town or city is given at the top thereof. The dates of peaks of population plotted in this manner show the distribution of the length of the period of decline of town or city It is obvious that the earlier the peak year the longer is the period of decline. The decline percentages are calculated on the basis of the population for 1951. The towns of continued growth are shown by pitch black rectangles which, very obviously, do not contain any date.

APPENDIX III

The classification of towns into monomial, binomial, trinomial, quadrinomial and polynomial towns according to their having one, two, three, four, or more than four occupations which are so predominantly pursued that they may be taken as to define the functional character of the town was suggested by the author in an article published in The Geographer Vol.XII 1965. This classification is mainly aimed at emphasizing the multi-functional character of the towns which, barring only rare exceptions, is a universal feature of the urban centres. The common practice of designating towns with one characteristic function such as industry, commerce, mining and the like and classifying them as industrial, commercial or mining towns seems not only very arbitrary and subjective but also very much contrary to the factual position that a town so designated (i.e. the mono - functional town) may, and infact does, usually have a few other urban functions so significantly developed that they may deserve consideration in the definition of the functional class of the town. It is, therefore, very desirable that all the significant and critical functions should be invoked to define the functional class of the towns leading to the suggested system of classification into monomial, binomial, trinomial etc.

For the assessment of the significance of the functions for inclusion in the group of functions defining the class of the town the author has developed an empirical mathematical formula which may be expressed algebrically as

$$\partial = \sqrt{\frac{\Sigma D_p^2 - \Sigma D_n^2}{N^2}}$$

where ∂ is the deviation, Dp and Dn are the positive and negative differences from the middle value of the theoretical-curve value of the combination and N is the number of functions in the combination. Since it is only the relative rank of the value of deviation which is needed the root sign may be ignored and the formula may be used in the form

$$\partial^2 = \frac{\Sigma D_p^2 - \Sigma D_n^2}{N}$$

The maximum positive value of ∂^2 gives the critical combination of functions which defines the functional class of the town.

The working of the formula may be illustrated by the following example:

Let it be required to determine the functional class[1] of the Jahangirabad, a town of Bulandshahr district. The percentages of persons occupied in various occupations in 1951 are found to be:

I.	Production other than cultivation	26%
II.	Commerce	26%
III.	Transport and Communications	9%
IV.	Services and miscellaneous occupations ...	20%
V.	Non-cultivating owners of land, and agricultural rent receivers	1%
VI.	Cultivators and cultivating labourers ...	18%

1. Both the occupation as well as employment figures may be used as a measure of the function of a town. (See Chauncy.D.Harris, A Functional Classification of Cities in the United States, Geog. Rev., 1943,pp.86-99 and Howard J. Nelson, A Service Classification of American Cities, Eco.Geog.,1955, pp.189-210.

Arranging these percentages in a descending order the figures may be retabulated as follows:

Class of Occupation	Percentage
I	26
II	26
IV	20
VI	18
III	9
V	1

For the calculation of the critical combination defining the functional class of Jahangirabad the necessary calculations may be tabulated as given below:

	Mono-function	Two-function	Three-function	Four-function	Five-function	Six-function
Class of function and Percentage of the function	I 26	I 26	I 26	I 26	I 26	I 26
		II 26	II 26	II 26	II 26	II 26
		...	IV 20	IV 20	IV 20	IV 20
				VI 18	VI 18	VI 18
					III 9	III 9
					...	V 1
Middle value of the theoretical level of reference	I 50	I 25	I 16.7	I 12.5	I 10	I 8.3
		II 25	II 16.7	II 12.5	II 10	II 8.3
			IV 16.7	IV 12.5	IV 10	IV 8.3
				VI 12.5	VI 10	VI 8.3
					III 10	III 8.3
						V 8.3

contd.

							I	13.5	I	16	I	17.7
Difference	I	-24	I	1	I	9.3	II	13.5	II	16	II	17.7
			II	1	II	9.3	IV	7.5	IV	10	IV	11.7
					IV	6.3	VI	5.5	VI	8	VI	9.7
									III	- 1	III	0.7
											V	- 7.3
Difference Squared	I	-576	I	1	I	86.49	I	182.25	I	256	I	313.29
			II	1	II	86.49	II	182.25	II	256	II	313.29
					IV	10.89	IV	56.25	IV	100	IV	136.89
							VI	30.25	VI	64	VI	94.09
									III	- 1	III	0.49
											V	-53.29
Sum of difference squared		-576		2		183.87		451		675		804.76
Sum divided by the square of the number of functions		-576		0.5		20.43		28.2		27		22.35
Maximum positive deviation								28.2				

Hence the town is a four - function or quadrinomial town (I,II,IV,VI)

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6. MAPS

One-inch maps of the Survey of India	Sheets:- 53 F / 11, 12, 15 and 16. 53 G / 1 - 16. 53 H / 1, 5 - 7, 9 - 16 53 J / 4 53 K / 1 - 4 53 L / 1 - 4 , 7 and 8
District Maps	District Gazetteers of the Various Districts, 1901-03.
Soil and Landform Maps	Settlement Reports of the Various Districts, 1891-92.